

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

JUNE 13, 1955

50 CENTS

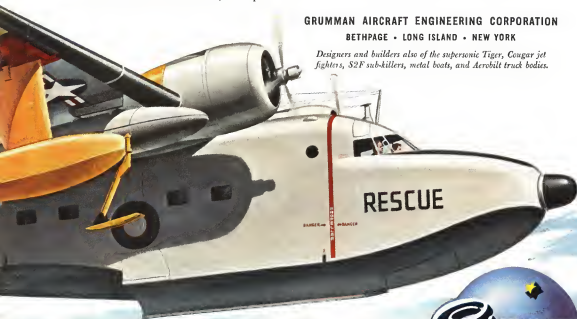
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North American F-86 Sabre



Grumman F9F Tiger



Martin B-26



Douglas Corsair

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# Aviation Week

JUNE 13, 1955

VOL. 42, NO. 24

Official Office

New York 24-325 W. 42nd St., Phone LIncoln 4-3000 (Night LD 4-3005)  
Washington 4, D. C.—National Press Bldg., Phone National 2-3304  
Los Angeles 12-1011 Wilshire Blvd., Phone Address 4-4333

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Aviation Week is owned by Press Association, Inc., a subsidiary of Associated Press

Research and Marketing: Kim Nieldon, Mity Whitner, Freden, Jerome Rubelczyk, and Vladimir Rich.

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AVIATION WEEK • JUNE 13, 1955 • Vol. 42, No. 24  
Mailed by Air Mail



Published weekly by the National Air Mail Publishing Company, Inc., 1000 Broadway, New York 19, N.Y. (Postmaster: Please send address changes to National Air Mail Publishing Company, Inc., 1000 Broadway, New York 19, N.Y.)  
Subscription prices: \$5.00 per year in advance. Single copies: 15¢. Payment in advance only. No refunds. Second-class postage paid at New York, N.Y., and at additional mailing offices. Postmaster: Please send address changes to National Air Mail Publishing Company, Inc., 1000 Broadway, New York 19, N.Y.  
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## Domestic

**Atomic Energy Commission** has asked Congress to provide \$37.9 million for "sharp intensification and expansion" of its aircraft nuclear propulsion program in fiscal 1955. Sharp increase from the estimated \$2.3 million spent on the project in fiscal 1954 is warranted, AEC told a House Appropriations Subcommittee. In commenting developments in the past year, including a new approach to the problem. Money will be used to emphasize research and development, carry out experiments and start operation of facilities at the national reactor testing station.

Institute of the Aeronautical Sciences selected Maj. Gen. Albert Boyd, commander of Wright Air Development Center for this year's Otis C. Christie Award and Dr. Gertrude Gabelko, WADC civilian scientist for the 1954 Thomas H. Stone Award. Boyd will be presented June 23 in Los Angeles at the Fifth International Aeronautical Conference, sponsored by IAS and Britain's Royal Aeronautical Society.

**Hedco-Air, Inc.** and U. S. Air Force announced last week that the company's Thrust banking system, an artificial device, will be standard equipment on latest military jets. Made in great order was awarded from Republic Aviation Corp., which will install the system on its RF-51F. Military Air Transport Service also confirmed a week ago Thrust system applicable to its investment class. It is a standard equipment on the ATD, B-66, T-100, B-47 and B-52.

United Air Lines ordered two more DC-6B airplanes and one for the Convair 440 from Cessna-Wright Corp.'s Electra Division at Gulfstream, N. J. They will give UAL four DC-6B and three 140 crew training seats.

**Solar Aircraft Co.** secured a \$2.5-million contract from Cessna-Wright Corp.'s Wright Aeronautical Division to produce aircraft and other components for "low cost" light aircraft engine. The San Diego firm is completing negotiations for a contract to develop and build subsonic for a British aircraft company.

A. Daniel Frankforter, 48, chief of the photographic laboratory in Fordchild Engine & Airplane Corp.'s Aircraft Division, died May 29 at Worcester, Pa.



## Eisenhower Gets Light Twin for Commuting

President Eisenhower's use of an Aero Commander 440 light twin-engine aircraft for commuting from Washington to Gettysburg, Pa., born off open water adaptation of flying by army businessmen who have been reluctant to go short. Telephone industry spokesman say, Eisenhower's pilot Lt. Col. William C. Dwyer (right) was the President back it a pilot to fly the approximately 90 mi. then to go to his

## Financial

**Lockheed Aircraft Corp.** reported a net profit of \$4,906,000 for the last quarter of 1954, decreasing from \$4,808,000 for the same period last year. Sales totaled \$190,941,524, decreasing 12% from \$215,574,384. Backlog Apr. 1 \$1,053,461,000.

**North American Aviation, Inc.**, declared a special quarterly dividend of 77 cents on capital stock, payable July 6 to shareholders of record June 16.

**Northrup Aircraft, Inc.**, will pay a 40-cent quarterly dividend June 16 to capital stockholders of record June 6.

**Tenneco Aircraft Corp.** declared a regular quarterly dividend of 15 cents on common shares, payable July 5 to stockholders of record June 15.

## International

**Canadian Pacific Airlines** made first direct flight to the Pacific Northwest Coast on delivery the 52 Boeing jet transports by mid-1955, CFA President C. W. McConachie announced in London last week. He arrived on the airline's inaugural transport flight between Vancouver and Amsterdam. Canadian

Pacific wants Comet 3s to replace Douglas DC-6Bs on coast-to-coast service (AW May 9 p. 113).

**Suavo Alouette 2** set a helicopter record altitude of 77,758 feet June 5. The French rotor, powered by a Turbomeca Palouste jet engine, hit record the 24,000 feet mark under Oct. 17, 1954, by a Sikorski HO4S.

**Vought Brothers Airlines** completed a seven flight of its B-45 Super Corsair, the first since the carrier will begin scheduled service on the 1,270-mile route July 29 with 60 passengers. Lockheed Super Constellation.

**Airlines Colombia National Airlines** contracted with Pan American World Airways for accommodations of 20 DC-6s to 10/100 configuration. Total cost more than \$3 million.

**Royal Canadian Air Force** has issued its authorized strength of 41 squadrons, the Defense Department reported. Nine fighter squadrons are equipped with all weather Avon CF-100 jet interceptors.

**Bell Aircraft Corp.** licensed Hubschberger-Bernstein Gerdauhof of Hubschberger to sell commercial helicopters and spare parts in West Germany.

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## Washington Roundup

### New Aircraft Investigation?

Senate Finance Committee headed by Sen. Hiram Bland (D-Mo.) has made a study of the reason for the loss in aircraft manufacturing stock values since the Vietnam buildup was started in mid 1959. Sen. Hiram Bland, (R-Mo.) has turned over a report going forward data on value increases to the committee. It was drawn up by the staff of the Senate Appropriations Committee, of which Bland is a member.

The appropriations investigation was triggered off by a letter Bland, received from a Connecticut businessman, Stanley Goldsmith, complaining he had made a paper profit in a few years of \$10,000 on an investment in 100 shares of stock of Douglas Aircraft Co. "Did you make a paper profit?" Goldsmith questioned. "Am I entitled to this profit? Should a corporation be allowed to make such high profits at the expense of the government?"

Bland, read the letter to the finance committee during testimony being conducted on recapitalization law.

Three other congressional committees are looking into aircraft profits from different angles. House Appropriations, House Armed Services Investigating Subcommittee, Senate Banking and Currency (AW June 6, p. 11)

### Talbot's Lead

Senators of Air Force Harold Talbot led the Administration's case before Senate Finance Committee for enactment of the Recapitalization Act, pointing out that this provision against excessive profits is particularly needed in the aircraft field, in which the major portion of contracts nowadays must be accepted. Prompt enactment of legislation extending the law to Dec. 31, 1959 certain. All passed the House without debate.

### Quick Airport Action

Report quick Senate action on legislation providing for \$185 million in airfield and airport development program for the next five years (see p. 13).

Commerce Committee Chairman Warren Magnuson (D-Wash.), says the full committee will act on it at its next meeting, rather than wait as long.

The aviation subcommittee, headed by Sen. Mike Mansfield (D-Mt.), completed hearings in a week.

### White House Dust

The Trans-Alaska Cargo Case in which the Civil Aeronautics Board is expected to have recommended certification of Seaboard and Western Airlines as a trans-Alaska all-weather carrier, continues to gather dust at the White House. Recent presidential action on other international cases—Trans-Pacific, Bulbin, States-Alaska—speculation that the CAB decision would also get attention from the President.

Monsieur, the French cargo carrier Airwork Limited is authorized to perform all-cargo service across the Alaskan route along Alaska DC-6A routes and crew.

### Engineering Talent Waste?

Mounting criticism that U.S. aircraft industry makes inefficient use of engineering talent and that construction would increase much of the alleged shortage is receiving attention at the Pentagon. Some civilian officials feel

strongly that Defense Department general rules must take a large share of the blame, citing cases where as many as 40 times the staff is a single design competition. "Waste of engineering staff under this system is huge. Studies by the Air Force and Navy show that it is not the lack of design engineering talent, it is the lack of design engineering talent."

Keep pace with technological progress. New ideas are coming along faster than they can be handled, which is one of the reasons for House Committee's recent change of the criteria for design and construction in approach to new weapons (AW June 6, p. 11).

### Bilateral Concessions

Bilateral negotiations between the United States and West Germany in Washington last week pointed to widening concessions in other markets as a concession made to the State Department in foreign agreements is bilateral agreements. Concern also exists over the so-called attention paid by U.S. citizens to the situation.

Entry of Luftwaffe into trans-Atlantic service will mean severe competition in American carriers. In the last six months of 1954, 71,475 passengers traveled between the U.S. and Germany, 64,767 of them on U.S. carriers. The American World Airways air service runs points in Germany and Trans World Airlines over. The German government wants to get Luftwaffe into the lucrative U.S. air market to the greatest possible extent and has done most to improve trading to accomplish this.

Much of the concern among U.S. airline people is over entry of foreign carriers into western U.S. markets, such as coasting and proposed transpolar service which does off to the fact that they are based on the United States on the way to Europe. Proposed services across the U.S. by British Overseas Airways Corp. and other foreign carriers also would penetrate the modest and other interior markets.

Foreign governments like to look south on a point-to-point basis in which regard to the market value of U.S. carriers agree that the relative economic value of each point should be considered. The State Department is caught in the middle between these arguments and foreign policy considerations.

A U.S. dispatch, headed by CAB member John Lee is making a study of Japanese airlines in Tokyo in the course designed to strengthen our differences in interpretation of the bilateral agreement between the two countries. Discussions will also be held at the end of the month with the Netherlands government in an attempt to establish a bilateral agreement.

### 'Tremendous Trifle'

Top level Defense Department officials show no great concern over congressional investigations, either threat, said an official. Last week, only soon after an Air Force captain made news headlines by admitting to a congressional committee that he had been a spy while under suspicion for bribery in his procurement job, Defense Secretary Charles E. Wilson was asked by the press if he cared to comment on the current investigation. "There are going to be," he asked. "So it is not a tremendous waste."

The press replied that it was going on and was not concerned with color laws.

Replied the secretary. "That's it that tremendous waste category, isn't it?"

—Washington staff



## American Buys Lockheed Turboprop

By Robert Hotz

New York—American Airlines jumped into the jet transport race last week with a \$65 million order for 35 Lockheed Electra turboprop airplanes.

The joint statement by American Airlines President C. H. Smith and Lockheed Aircraft Corp. President Robert E. Gross, confirmed Aviation Week's prediction (May 15, p. 11) that American had shifted its turboprop transport specifications to a faster, longer range aircraft carrying a heavier payload and that a decision would be made soon between the Lockheed and Douglas entries in this competition.

Biggest surprise in the Smith-Gross statement was the fact that no decision has been made on the powerplants for the Electra. This, and

"Lockheed's design proposes the Allison T38 engine, more conservatively estimated as the Allison Model 501" but no decision has yet been made concerning the powerplant as the Electra will be designed to use engines as high as 5,000 hp with commercial model engines."

**Allison Engine, If . . .**

Indications were that American Airlines would eventually buy the Allison T38, rated at 3,750 shp, for the Electra, if Allison pushed development hard enough and engaged a commercial service organization to back the engine in field service. However, it is believed that American will delay this decision until next General Motors Corp. officials make it clear that they will back the Allison project with all of the resources and prestige of the giant corporation.

Meanwhile, American has been exploring the development of the Rolls-Royce III 100 turboprop rated at 4,000 shp as a possible candidate for the Electra. Pratt & Whitney has a 5,700 shp T34 turboprop in production for military transports but it is unlikely that it would figure in the Electra deal because Lockheed and P&W have had a sharp disagreement on its possible use. (Continued on page 14)

### Lockheed Electra Specifications

Cruising Speed	Over 400 miles per hour
Cruising Altitude	Up to 30,000 feet
Power Plants	Not decided (Aircraft design based on Allison Model 501)
Takeoff Power	Depending on powerplant, at least 3,750 shp
Wingspan	95 feet
Length	101 feet, four inches
Overall Height	34 feet
Gross Weight	59,500
Fuel Capacity	4,178 gallons
Cruising Range	2,000 miles
Seating Capacity	64, plus six in lounge
Cargo Space	400 cubic feet, exclusive of baggage space
Cargo Capacity	4,800 pounds



## Douglas Builds Prototype Turbojet DC-8

By William Goughlin

Santa Monica—Douglas Aircraft Co. has started work on its DC-8 jet transport prototype, with first flight scheduled for December, 1957.

Airline deliveries of the DC-8 will begin in 1959.

The Douglas jet transport will be powered by four 11,000 lb thrust Pratt & Whitney J57 engines mounted in pods on the wingback wings.

The Douglas decision to build a DC-8 prototype followed a meeting of the board of directors of the company at the Santa Monica plant early last week. The Douglas action undoubtedly was prompted by a belief that the American Airlines order for Lockheed's turboprop transport, together with the USAF order for Boeing jet trainers, leaves Douglas with a clear shot at the commercial jet transport field.

### Altitude Interest

The company said that retirement and immobility airlines throughout the world have shown great interest in the project but actual contract discussions and negotiations have been held in absolute secrecy the decision to build a prototype.

A Douglas spokesman said the firm had no airline orders to convert to "jet."

The company said the new jet airliner will have a top speed in excess

of 550 mph, which will enable it to make regular nonstop flights between the U.S. and Europe, regardless of headwinds.

Gross weight of the overwater ver-

sion will be 217,000 lb. Domestic versions will have a 211,000 lb gross. Span of the DC-8s wingtips will be 114.5 ft., length 149.5 ft. and height 40.2 ft.

This is somewhat larger than Boeing Airplane Co.'s 707 jet transport, givins type which is already being built about the same size as the KC-119 tanker for which Boeing has a \$700 million USAF production order.

Varying configurations call for from 60 to 125 passengers.

The 157 turbojet was recently con-

### Douglas DC-8 Specifications

Cruising Speed	Over 550 miles per hour
Cruising Altitude	Above 35,000 feet
Power Plants	Pratt & Whitney JT3L
Takeoff Power	11,000 lb thrust
Wingspan	114.5 feet, six inches
Length	149.5 feet, six inches
Overall Height	40 feet, two inches
Gross Weight	211,000 lb. (domestic) to 217,000 lb. (overwater)
Fuel Capacity	35,000 gallons
Cruising Range	At least 3,700 miles
Seating Capacity	60 to 125

## Douglas DC-8

selected for commercial use by the Civil Aeronautics Administration. Although the Air Force has not yet awarded military aircraft orders that still prevent Pratt & Whitney from showing the engine in potential service customers. Commercial designation of the JT7 is the JT3D. It will probably be rated at 11,600 lb static thrust at sea level. The JT7 has been in production in military version since early 1955.

## Ready Times

Douglas lists the following aircraft times for the DC-8: Los Angeles to New York, four and one-half hr; New York to Paris, six and one-half hr; Honolulu to San Francisco, a little over four hr.

The company said its large jet transport will be able to operate from existing major air terminals.

The Douglas decision comes at a time when the company is making an unprecedented number of commercial orders, with orders for more than 170 propeller-driven commercial transports since January. This new order is the company's greatest sales rise in both number of aircraft and dollar volume.

## Family Resemblance

The DC-8 will continue the Douglas' look familiar throughout the DC series. Although streamlined, it will resemble the new series in a Douglas pattern.

Company President Donald W. Douglas does not expect the jet to cut into orders for piston transports but believes it will fill orders into production behind the DC-7C. Due to this, most it will take to develop the DC-8. The firm also believes order for propeller-driven transports will continue long after the jet gives into production.

First orders from Douglas DC-7C, on order for deliveries beginning in 1948. They will be nearly 200 mph slower than the DC-8. The hauling on these aircraft totaling nearly 3500 tons will keep the Scott-Morris plant busy through the first quarter of 1948.

## Spur to Boeing

The Douglas decision to go ahead with the DC-8 is expected to spur Boeing efforts to obtain a firm order from the Defense Dept. on whether the Stratofortress will be purchased in two or three commercial jet transports for use at completion of orders for the B-47 jet bomber.

Boeing recently reported at aviation that it will be able to deliver the first passenger jet transport to the U.S. in 1948. This would put Boeing's year

ahead of Douglas on the jet transport, if the Air Force goes ahead.

The Douglas DC-8 decision follows three years of technical studies and engineering development which cost the firm more than \$1 million.

Reports from inside the Scott-Morris plant on the latest DC-8 design differences from previous versions have been some time ago with greatly improved economic performance. The company was operating out of the new jet will be lower than that for current aircraft.

No announcement was made on covering reverse thrust devices for the Douglas jet but it is expected that production models will be equipped with reverse thrust.

## Lockheed Electro

(Continued from page 12)

in the Model 144B Super Constellation. The Electro order, which calls for initial delivery in late 1958 with all 150 seats in service by mid-1959, will mean American Airlines a continued expansion lead in the domestic airline field.

Eastern Air Lines is expected to follow American with a substantial order for the Electro. American probably will make more on the Lockheed line for non-competing airlines who want to buy the Electro, but it will probably be at least six months after American takes delivery of its first propeller transport. American Airlines will be able to get the same aircraft into service.

The initial order for 35 Electros probably will be followed eventually by more orders to complete American's fleet replacement program on its main line Constellation. Airlines already estimate that Lockheed has an opportunity for over 200 domestic jet line orders on the Electro in addition to the large order which it will begin to cut into Western's Constellation sales.

## Joint Design Effort

The Electro will be the first commercial jet transport aircraft built in the United States. The design was a joint effort by Lockheed's engineering staff headed by Vice-President Bill Hibbard and American Airlines' engineers sparked by Vice President William L. Keith. The transport will carry a payload of 70 passengers, 100 seats plus six in the lounge and 4,000 lb of fuel and cargo, over a 2,000-mile range at a cruising speed will allow 400 mph. The Electro is expected to have a 100 mph cruising speed advantage over the Western's Constellation jet transport about to go into U.S. service this summer via Capital Airlines.

The Electro will have a two-stage

length of 101 ft 4 in. and low set wings with a span of 95 ft. Turbo-prop engines are mounted with tail propellers on the upper wing surface so that no holes are necessary in the wing span and the structural integrity of the wing can be maintained. Lockheed has abandoned its single tail of the Constellation for a triple tail design.

## Cabin Convenience

Better loading steps and easier space for carrying baggage—both features of American Airlines Constellation—have been designed into the Electro. Interior cabin is several inches wider than any current transport now flying, according to American officials, making it possible to use wide seats equipped with individual tables for eating, writing or reading. Unusually large cabin windows measure 20 in. high and 16 in. wide.

The Electro will have a three-level loading gate and an overall height of 34 ft. on the top of the tail fin. Airborne radio will be standard equipment and the control cabin will be nonpressurized. Crewed flight crew will consist of two pilots and a flight engineer.

Although fuel economy and fuel economy will be used not have to wait a jet engine order, turbo-prop tests have been completed to enable the Electro to operate on 3,000 H.P. engines.

American will use the Electro in its standard medium haul transport with the 1,750-mile Chicago-Los Angeles segment. American Airlines will probably get into service aircraft out of New York, on transport operations to Chicago and to Washington on the Boston-Washington run.

American probably will eventually be involved in a joint effort with Lockheed to replace the DC-7 for its non-transportation service. With the engine which built into the Electro, it will eventually give close to the 1,000-mile range, close to more powerful turbo-prop engines available.

## Final Mail Pay Rate Set for Trunklines

(Continued from page 12)

Final mail rates for trunk airlines have been set by Civil Aeronautics Board in an order establishing a monthly circuitous formula.

Lockheed service mail pay will be based on a 30-day mail interval. It will be based on changes in fuel and handling charges. The line level rate set for all carriers is 50.17 cents per ton-mile. Current handling charges vary with the use of the airport. Class A airports have the lowest charge in 3.12 cents per pound. Class B airports cost 4.64 cents per pound. Class C airports cost 5.12 cents per pound.

# Russians Will Show Off More Aircraft

By William Coughlin

Toronto-Russia will show more of its new aircraft in a June 30 air show near Moscow, Soviet organizers told Aviation Week, in an exclusive interview here.

They said the new models will include U.S. fighter jets, bombers and fighters. Soviet organizers told a week's report of U.S., Canadian and British aircraft and engines on display at the Canadian International Trade Fair.

"The air demonstration over Moscow will display advanced models made all over the world since 1945," one of the Russians declared.

Asked whether this meant aircraft not seen in the Moscow show only last month, the Russian replied "Yes, in such time to show something new." The Moscow demonstration will be in two sections, one for military aircraft and the other for sport and civilian planes, the Soviet organizers said. The demonstration will include the new aircraft, some of which will be shown in the Moscow show. The new aircraft will be shown in the Moscow show. The new aircraft will be shown in the Moscow show.

(The Soviet Air Armada at the Russian Embassy in Washington, D.C., says more displays will be held in Moscow but has no details to disclose.)

The Russian technicians declined to discuss details of their exhibition during the interview but they said they expected the Soviet aircraft industry, not the government. Two members of the Soviet contingent were from the command in Ottawa, but from six to eight others were from Moscow.

They first arrived yesterday for Aviation Week while leaving U.S., British and Canadian aviation exhibits at the trade fair and then spent a later interview following the Canadian Air Show.

## Red Progress

Asked about Russian advances in the aircraft and ground missile fields, one of the Soviet engineers commented "Progress is coming along well." Pressed for details, he added, "Compare what you see here in Canada with what we see here in Moscow—that will indicate the progress of our industry."

Further questions brought a shrug of the head and a "yes," which there was no need to translate.

When asked to comment on the American display, one member of the Russian delegation declared "Everything we have seen is excellent."



RUSSIAN OBSERVERS at Canada's National Air Show in Toronto look at a de Havilland Otter. Posing on stairs (left) is the OH-1300, a new aircraft in the Canadian Air Force. (Right) is the OH-1300, a new aircraft in the Canadian Air Force. (Right) is the OH-1300, a new aircraft in the Canadian Air Force.

Their Canadian counterparts said, however, that comments between the engineers in Moscow indicated the Soviet team was considerably more prepared with what it had seen of U.S. engines than was indicated.

The Russians were extremely thorough in their examination of aircraft and engines on other display. U.S. exhibitors, including the Martin Marietta, Curtiss-Wright J67, General Electric J47, and Hughes Aircraft Co. made the central exhibit, all of which drew Soviet interest.

## Detailed Sketches

The members from the Soviet Union spent the first day of the fair in a group tour and thereafter split up into small groups to take in those exhibits which interested them the most. On the second day, they gathered at the first outdoor cafe to compare notes.

At the Curtiss-Wright exhibit, the Russian took photographs of the J67, made detailed pencil sketches of parts of the engine and asked technical questions. They took notes of particular interest to them.

When Curtiss-Wright engineers from North America and Elmer McDermott were asked what they told the Russians, they said the Soviets asked "very technical questions about our jet engines but we gave them no information that they could not get from reading newspapers or trade magazines." The U.S. Navy sent over P-47 Thunderbolt, P-40 Corsair, a P-51 Mustang, and a P-53 Mustang.

and then said about the additional power supplied by the afterburner. "We told them that figure was classified secret," Voznesenskiy said.

Examining the fuel pump on the J67, the Russians asked, "Do you subtract extra parts? Who makes your fuel pump?"

Clair J. Martin, representative of the Russians showed great interest in details of the J-47, comparing it to the V-1 and V-2. One Soviet engineer commented "It is not compressed."

At Canadian exhibit all in P-50, B-26, and a number of T-33, four members of the Russian party said they might take notes on the type, and examine the aircraft more closely. Given permission, they moved into the lounge and among the B-26. After a good conference, their next order was the Canadian representative if they might take all the evening so that they could "see inside." The request was turned down politely.

When asked about access to a display of radar fire control equipment, one of the Russians declared, in English, "Secret, secret."

## Little Interest

Although the Canadian Air Show featured more than 100 Canadian and U.S. aircraft, there was little in the Soviet display to interest the Russians. Most of the U.S. aircraft appearing were obsolete. The U.S. Navy sent over P-47 Thunderbolt, P-40 Corsair, a P-51 Mustang, and a P-53 Mustang.

Oh, U. S. Air Force planes appearing were three F-4s. However, a B-47 Stratojet was concealed without explanation.

Added after the air show if the Russians were disappointed with the display of obsolete aircraft, the leader of the Soviet delegation declared his pleasure at the exhibition and expressed the hope that the Cosmonaut would

visit the Russian Air show on June 19 so that they can compare. He also stated the intention of the Soviet Union to take part in next year's show. He commented on the impressive audience attendance of the C-130s but exclaimed an other aircraft. "Who should we be disappointed?" asked one of the Russians. But then he asked unceremoniously, "Who was the B-47 concealed?"

## RCAF Demotes Air Vice-Marshal For Controversial AWA Speech

**Toronto—**An Air Vice-Marshal John L. Plant of the Royal Canadian Air Force was demoted last week for remarks made before a dinner meeting of the Aviation Writers' Association on June 2.

The government in Ottawa announced that Plant had been ousted from his post as RCAF Air Member for Technical Services and named head of the RCAF's Air National Command. Whether previous actions was planned against Air Marshal C. R. Stinson, RCAF chief of staff, was not announced. Both officers drew a reputation from the Ministry of National Defense, Ralph C. Cooper, for handling statements made before AWA sessions.

The controversy was strongly similar to the U. S. situation in which high Air Force officers were chastised by the Defense Dept. for statements on Russian air power (AWA June 6 p. 136).

### Wrong Impression?

An Air Vice-Marshal Plant was quoted in Canadian newspapers as calling for abolition of the Canadian Army to save money and suggested that it was able for the RCAF. He also was quoted as saying that while war was inevitable the war was "seen around and will" to take me the Russians and could "laugh the hell out of them."

Many U. S. newspapers attacking the convention, felt that lateral reporting in Canadian newspapers of Plant's remarks delivered in a humorous vein.

### AWA Elections

**Toronto—**Aviation Writers' Association elected the following officers at its convention here last week: Vice President, Donald W. L. St. Louis Post-Dispatch; Ross Williams, Hasting Associates; and George Rhodes, San Francisco Call Bulletin, vice president.

When J. Coughlin, Aviation Week, was named regional director in Los Angeles.

## Senators Urge More Titanium Research

Government funds should be channelled into research and development on titanium to increase the production of this important production, according to a bipartisan memorandum of the Senate Armed Services Committee.

The report by Sen. Stuart Symington (D-Mt.) and Sen. James O. East (R-Pa.) pointed out that government-subsidized facilities for titanium production will be able to produce 22,000 tons annually, but that commercial quantities to only 3,100 tons in 1954 and will amount to a total of only 1,700 tons in 1955.

Other authorization conclusions: "The government, by sustaining substantial loss in obtaining additional production of a product not yet commercially acceptable, has not the largest means of dollars and cost have a great deal more."

The second senator's statement in introducing the bill, "The government support, provided that ultimately the metal can be made properly and produced at reasonable cost."

"More complete knowledge of costs would be obtained by comparing the government's subsidizing, especially at the price of the product depends particularly upon the terms of the subsidy." The subcommittee observed that the government "knows very little about its own use of titanium production in general and the value of the product in general."

## Moore Resigns Post As ACC Secretary

Los Angeles, California secretary of the Air Conditioning Committee, in August last week effective July 31 or so earlier than a successor is named before then.

Moore told Loren S. Rubenstein, Under Secretary of Commerce and ACC chairman that "I am going to resign my position as secretary of the Air Conditioning Committee. At this time, when is the chairman to be named, or at least expect, the interim period until is necessary. For this reason, even though the committee is relatively important, until all agencies are named, the chairman should have some public confidence in him. Hence, I believe that you should nominate a man of your own choosing."

Robert Morris, former Under Secretary of Commerce, selected Moore for the ACC post in January of last year.

Moore plans to remain in government work. In March of a period of service to the Administration.

## USAF Asks \$356 Million to Rush B-52s

**Washington, D. C.—**U. S. Air Force has asked Congress for \$356 million to pay for accelerated production of the Boeing B-52 bomber, which is the bomber to meet the threat of growing Soviet air power (AWA May 21, p. 12 June 6, p. 12).

The request, delivered to the Senate Appropriations Subcommittee on the Armed Forces by Defense Secretary Charles E. Wilson, would be added to the House approval of \$150 million in aircraft procurement budget for Fiscal 1956. It would increase the total for the year \$206 million into the figure originally sought in President Eisenhower's budget.

At the same time, Wilson asked the House to increase \$10 million in loan guarantee program's impact for 1955 for aircraft production and development projects. In addition to increasing the amount referred by the House, Wilson also planned to transfer another \$50 million to research and development for studies to step up the production, this time.

"This would give Assistant Secretary Donald Quigley a record amount for acceleration in the armed forces. The companies find it more for any project that studies the 'breakthrough' wings and much great demand help to cut rates on the scale."

While Congress prepared to act, Wilson Secretary Harold E. Talbott reported before the Senate Defense Committee on the day of sharp criticism from Democrats and accused them that "USAF will have superior fighters made to meet the Russian threat within the next two years."

While an answer was disclosed for accelerating production in the case of the B-52, Talbott's military aide, Brig Gen W. C. Higgs, said the secret was referring to the "Constant Service" or fighter jets in production. This includes the North American F-100 Super Sabre, the McDonnell F-101, the Douglas F-102 and the Lockheed F-104. Only the F-104 is in operational status and Wilson and USAF had not accelerated the speed of its output.

### Confusion Over Funds

Indeed, Sen. John Jackson (D-Wash.) said USAF does not have an emergency fund and said that the Russian bombers. Asked to comment, Wilson said he would ask Gen. Nathan F. Fanning, USAF Chief of Staff whether he has such an emergency fund.

There was confusion over the money toward to speed B-52 production. On May 24, two days before the acceleration was announced, Wilson said he did not expect to ask for more than \$100 million.

Last time two years after he asked the Senate committee to add \$356 million to the budget, the Secretary had said that \$100 million was the figure for the following exchange cost, place.

### Wilson Meets Press

Press Council then tell us, in, what we told the committee today? Wilson I don't think I could do the complete detail. What we were doing basically was discussing all of the questions that we have when you read up a budget discussion, and I want you to see, along with a group of men from the Defense Department, I can talk you will be back up I felt quite comfortable. And I think we are going to get the thing all straightened out in a week or a fortnight, so it can be done to our best advantage.

Press Mr. Secretary, it's been reported you asked for \$356 million to accelerate B-52 production, is that?

Wilson We have asked for a different kind of money to step up the production, this time.

Press Does it mean \$356 million more next year than in your original budget?

Wilson No, it doesn't.

Press Could you say what it does involve in the way of?

Wilson Well I would rather someone else finish what I say but the important, or difference of opinion comes in the question as to how to do a bigger total budget then we asked for being to whether we can do it within the limits of what we have asked for if they will reduce some of the things the House talked about, we cut it off the budget. (It's about what it amounts to.)

Press Well, it's \$356 million more than passed the House last year?

Wilson Well I can't be absolutely categorical about what they do about the amount of the House bill, but such and if you read up B-52 production as announced, would that make additional \$356 million?

Wilson If we did everything that you said we had planned to do, this would mean some more expenditure because it's actually putting into the "66 year some additional production."

### Congressional Criticism

Meanwhile, members of Congress were watching Pentagon developments. Sen. Jackson and the Defense Department "has not been asked with the American people as the threat of Soviet air power. There is no question about it."

Chairman Wilson for withholding facts until 48 hours before the B-52 program was accelerated. Jackson said the Pentagon engaged in a half truth. We do have an emergency in the case of the Russian, but the situation will be met unless the aircraft production of the United States is increased substantially.

Wilson, we step up substantially, our general production of all kinds, the Soviet Union will regard us. Today the Soviet Union has more jet airplanes of all kinds than the U. S. and that more is in terms of thousands." Sen. Stuart Symington (D-Mt.) the new USAF secretary, said the entire



**WEIGHT 165 WITH AFTERBURNER** will be viewed in public by the first time during Pan International Aviation Exhibition June 10th at the Baggage Airport. Power rating of the engine, installed in the prototype Lockheed X-104 and General Motors PL117, is classified. The basic Weight 165 without afterburner produces 7,200/7,900 lb thrust.

program must be accelerated or canceled, it will appear to be a short time."

Rep. Charles Flood (D-Pa.) made a strong case of Defense Department reversals, calling the obligation an

## Senate Unit Restores \$8.8 Million Cut by House to NACA's Budget

Washington, D. C.—Senate Appropriations Committee has voted National Aeronautics Committee for Appropriations as full budget request of \$76.5 million for fiscal 1956, restoring an \$8.8-million House cut.

NACA chairman, Dr. Jerome Hunsder, called the House action "almost completely unnecessary" in the situation of the aeronautical situation. By making any possible research at this time, so as to bring into existence of the nation's air force.

He added: "Research needs of our aerospace program are critical. That cuts of research projects have a serious effect on the nation's defense." NACA has responded.

The recent trend toward looking at the funds appropriated for scientific research is somewhat in favoring the NACA to take basic investigations of great potential value.

The \$76.5 million approved for NACA is \$20.5 million more than the fiscal 1955 budget. This will provide for an acceleration of research effort and execution of these new ideas which will come into operation during the coming year.

### Flooders' Recommendations

A report submitted to the Appropriations Committee by Sen. Ralph Flood, who made an investigation of NACA activities for the Armed Services Committee, strongly recommended "outstanding of the House cut."

Flooders report said: "The NACA is not able to do as much research as it would like to do, not as much as the military and private industry would like to see it do."

"But the distinguished group of men and women comprising the main committee of the House of the Budget and the President, have agreed upon for the coming fiscal year a sum that expanded program under the new facilities coming into operation, and the judgment of these men is a source of confidence."

### Construction Budget

The \$11 million earmarked for new construction in NACA's budget includes \$4.5 million for a new test program research facility, to test the effects of radiation on structural materials, insulation, coatings, fuel materials and aircraft instruments and equipment. It will be located at the

new Propulsion Division of the Air Force. The total cost of the program is \$11.5 million more than the fiscal 1955 budget, when the House provided the defense appropriations bill.

## Levin Hight Propulsion Laboratory is Closed—Acquisition of approximately 100 acres for the facility is planned

Other programs provided for include: "Levin Hight Propulsion Laboratory, \$1.5 million, for an engine test system for the 16-ft. ramjet engine to be used in the testing of rocket motor over-reaction that becomes critical in the low supersonic speed range with large scale models."

Army Air Research Laboratory, \$6.5 million, for a high speed flight facility for investigation of aerodynamic heating, loss of surface materials and its behavior of materials in the speed range from Mach 9 to Mach 18.

Levin Hight Propulsion Laboratory, \$2.6 million, for construction of the 5-bc. 6-ft. propellant tunnel to measure its effects on research on propellant in orbitations through the initial stage of space from low transonic to Mach 2.

The tunnel is now located in a range from the high transonic speeds to Mach 2.

## NWA Moving Shops To Wold-Chamberlain

Northwest District Air Force will consolidate its research and operational headquarters in a new building to be constructed at Wold-Chamberlain field in Minneapolis. The new facilities will cost between \$14 million and \$15 million and are expected to be completed by the end of 1956.

NWA's move will be a part of the \$18.5-million expansion of Wold-Chamberlain by the Minneapolis-St. Paul Metropolitan Airports Commission. Its other projects include: "Construction of a 52,000-sq-ft. and main terminal building at the airport."

Western Air Force will build a \$400,000 hangar at the eastern terminal of W.A.C. Minneapolis-Columbia route.

Northwest will pay for its permanent headquarters under a proposed 10-year agreement that will include free use of the airport. Discussions were under way last week between NWA and the airport commission on terms of the lease.

One major working condition in agreement of the W.A.C. for the airport's facilities. The land, adjacent to

Fort Snelling, now is owned by the federal government.

Both Northwest President Donald W. Nease and Lieutenant Hight, chairman of NWA, predicted delays in drafting the final lease and plans for the building would be completed in the near future.

Preliminary designs of the new facility will be approximately 500,000 sq. ft. of hangar, shop and office space. It will not include one and NWA's current lease.

## Army Activates First Fixed Wing Plane Unit

U. S. Army is activating its first fixed wing tactical transport aviation company at Ft. Riley, Kan. The unit, at full strength, will be equipped with 71 de Havilland U-1 Otters.

After consultation with the air command, a new training course is now being developed for the purpose of Army transport aviation in tactical support.

Army transport aviation units are organized and are assigned within the Army. The transfer was, "to provide the ground commander with a means of achieving increased mobility in the combat zone."

The course recognizes the de Havilland U-1 as the standard fixed wing transport supplementing light, medium and heavy helicopter companies.

In combat, the Army continues the aircraft mission and the mission is to provide a means of transport in addition to simple logistics, these means will include:

- Exploiting the effects of tactical surprise.
- Slipping over terrain to seize an objective.
- Striking the enemy in the rear or flank.
- Exploiting movement of armored or mechanized forces.
- Observing.
- Co-moving with a tactical unit.
- Moving across it.
- Evading all host defenses.

In the field of tactical support, aircraft will be used to augment an infantry company, or a battalion, or a regiment of the headquarters responsible for logistics.

The single-engine de Havilland aircraft will be allocated to the new 14th Aviation Company, out of the aerial unit of 50 on which decisions have been started.

Authorized personnel for the 14th Army Aviation Company will be 45 officers, 50 enlisted men and one support officer. The unit is assigned to the Fifth Army.

# "They've designed the guesswork right out of this fuel pump."



## (The fuel systems engineer meant Hydro-Aire's new HY-V/L pump: the only pump with Design Predictability.)

"I know the people at Hydro-Aire had developed a new fuel booster pump and I'd heard about the fact that it's more efficient because it doesn't need the old vapor separator."

"But when they talked about Design Predictability I didn't get it... at first. So they asked us to call a meeting of the whole group... and in less than forty-five minutes they briefed us on an entirely new method of determining pump specifications. Take all the old 'guesstimates' out of writing a set of pump specs!"

The new HY-V/L pump has many advantages: it is lighter and more compact; it can handle large quantities of fuel vapor without separation; it has excellent pump performance; since it does not use a vapor separator it doesn't need the additional power required to drive it.

But the most important feature of this new pump is design predictability, because this feature has made pos-

sible an entirely new concept of determining pump specifications. You, the systems engineer, can call your exact shots with this method. You no longer have to pay the inevitable weight and power penalties that occur when a shelf item is modified.

It takes forty-five minutes to explain this method. Hydro-Aire is currently arranging these presentations with engineering management of airframe companies throughout the country. For further information please contact your Hydro-Aire Sales Engineer.

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## Avionic Components Neglected

Los Angeles—Long term development of avionic components is endangered by a Department of Defense tendency to emphasize and stress such as cost price versus volume.

This view was expressed by Dr. Irvin A. Getting, vice president-engineering and research of Rudolph Mfg. Co., one of the participants in the Electronic Component Conference held here recently. More than a thousand scientists, engineers and technicians attended the two-day sessions.

Dr. Getting told Aviation Week that the time cycle for development of avionic components is too long to fit into the weapons system schedule. Continued and more extensive military support for research and development of components is required to assure timely volume production and readiness for service use, he believes.

### Military Incentive

Still the Department of Defense has spent at least 10 times as much on component R&D as the commercial and industrial fields combined, he said.

This research and development is required because in military applications the incentive is to advance the scientific and engineering frontiers to keep qualitative superiority over an enemy," Getting explained.

Qualitative superiority means better, more reliable components, higher power or lower noise levels, more standardization, and capabilities for improved mass production.

Full development of these charac-

teristics cannot be supported by mere commercial incentive, Getting said.

The gap between avionic research and development and production status can be closed by proper government support, particularly with production requirements and reasonable quality government.

"These two factors," Getting told Aviation Week, "will aid in establishing specifications and introducing competition to prospective designers of military equipment."

### Incomplete Cycles

It is a situation now in that components often are used which have not gone through a completed development and production cycle introducing waste, operating difficulties and system problems, he said.

One example is which the military did a good job of anticipating its future needs has been the transistor. It spent millions of dollars on transistor research and development and more millions on production advanced contracts, with not and time in mind, Getting pointed out.

Even with this planning it will be 10 to 15 years before there is a substantial amount of military equipment incorporating these transistors, he believes.

The military approach on transistor was good thought, Getting said. "We need more of this and it should be applied to other developments such as magnetic components, lenses, high power tubes and new materials."

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### MILITARY AVIATION FUNDS

The three services have more than \$7.4 billion in obligated funds for new orders of aircraft, engine engines, guided missiles, electronics and related procurement on April 1. Not obligated funds contracts were cancelled during the first three quarters of fiscal 1958 totaled more than \$5.1 billion. Here are the details.

OBLIGATIONS (In Millions)	Obligated		EXPENDITURES (In Millions)	Expended	
	April 1, 1958	March 31, 1958		April 1, 1958	March 31, 1958
Army, surface and air					
	Oct. 1957	March 1958	Oct. 1957	March 1958	March 1958
	2,045	6,700	4,480	13,001	
	Army	115	1,115	5,079	
Navy					
	2,811	6,014	1,965	17,000	
	Naval Air Force	35	140	301	
	Naval Air Force	54	110	200	
Guided Missiles					
	300	771	220	701	
	Naval Air Force	115	115	115	
	Naval Air Force	150	150	150	
Electronic and related equipment					
	375	999	175	1,000	
	Naval Air Force	450	500	711	1,143
	Naval Air Force	100	100	100	100
Grand Total					
	3,750	13,484	6,560	20,000	
	Army	1,115	1,115	1,115	
	Navy	1,965	1,965	1,965	
	Guided Missiles	300	300	300	
	Electronic and related equipment	375	375	375	
	Grand Total	3,750	3,750	3,750	



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## Talbott Reassures SDIA on Dispersal

Los Angeles—USAM dispersal policy should not affect small defense firms located on the West Coast, Air Force Secretary Harold E. Talbott has assured the Small Defense Industries Assn.

"I do not believe that dispersal policy should affect small business or job contractors in any way," Talbott stated in a telegram to the SDIA.

The association had telephoned several times of disinformation against small West Coast firms which were reported to Edward L. Harting, Talbott's deputy assistant for national.

This situation was unknown at the level of the Secretary's office and will be investigated immediately," Harting told SDIA members. He pointed out that some contracts may contain clauses prohibiting West Coast assembly, but "if such clauses do exist, they should not extend to subsequent purchase of components or effect result business participation."

Harting said an effort would be made to drive prime contractors not to withhold orders from small business because of location.

## ODM Grants Writeoffs To Aviation Firms

Colorado Southern Chemical Corporation, W. Va., has been granted a \$1.7-million certificate of accounts by Office of Defense Mobilization for a titanium finish-on-factory facility with 90% of the amount allowed for rapid tax amortization.

Other certificates recently issued in similar.

William R. Smith Co., Order Battle, Iowa, also received equipment, \$11,000 certified with 60% allowed.

Robert H. Smith Co., Rockford, Ill., will be granted permit, \$10,000 certified with 60% allowed.

John E. Haring Co., Oakbrook, Ill., will be granted \$10,000 certified with 60%.

## Five-Fold Increase

Montreal-Airbridge volume will increase five-fold in Canada in the next decade and within passenger travel will double, forecast E. N. Robinson, president manager of the Canadian Airports & Transport Assn. at the annual meeting of the Canadian Manufacturers Assn.

Railways and steamships, once leaders of commerce, now are only followers, he said.

Passenger and cargo now standing on surface carriers now will move in great numbers to air transport.



## inside story of the **VISCOUNT**

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## Aussie Sabres

Royal Australian Air Force is beginning to receive "concordable numbers" of Australian built versions of the North American F-86 Sabre. Fighters shown at RAAF Tindal Flight, Murrumbidgee, New South Wales, were manufactured by Commonwealth Aircraft Corp. and are powered with an American manufactured Rolls-Royce Avon engine. RAAF has 90 Avon Sabres on order to equip its 15th Wing.

aircraft, military aircraft, \$11,000 cost with 80% allowed.

Aviation Electronics Inc., Newark, N.J. aircraft parts \$20,000 cost with 50% allowed.

Edgar Precision Products, Inc., Chicago, Ill. aircraft parts \$20,000 cost with 50% allowed.

Marine Electronics Corp., Philadelphia, Pa. aircraft instruments \$10,000 cost with 50% allowed.

Paul Aircraft Corp., Ft. Worth, Tex. military aircraft \$10,000 cost with 50% allowed.

D. S. Kennedy & Co., Concord, Mass. electronic parts \$20,000 cost with 50% allowed.

Radio Manufacturing Inc., Newark, N.J. aircraft parts \$20,000 cost with 40% allowed.

Radio Aircraft Corp., Santa Barbara, Calif. aircraft parts \$20,000 cost with 50% allowed.

Lockwood Aircraft Corp., Burbank, Calif. aircraft parts \$10,000 cost with 50% allowed.

Lockwood Aircraft Corp., Burbank, Calif. aircraft parts \$10,000 cost with 50% allowed.

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## NACA Flies VTOL Transport Model

A four-engine VTOL transport model part of the National Advisory Committee for Aeronautics' continuing research program on vertical-lift aircraft, has been test flown by scientists at NACA's Langley Aeronautical Laboratory.

Vertical lift of the model comes from the propeller assembly, turned through 70 deg. by a system of vanes that retract to form a monoplane wing. The model is a highly developed version of an early NACA test vehicle demonstrated at the 1955 Langley symposium (AVR May 18, 1957 p. 16).

Three pilots are for control about each of the stability axes. But the one with scale model through its paces in

hoisting tests earlier this year. Next scheduled phase of their work is the transition flight from vertical to level, level flight.

Flying characteristics so far determined are not outstanding, without extensive control studies, would be a problem in both pitch and yaw. But for a first step toward solving an extremely difficult engineering problem, these NACA model tests have given confidence and exciting results.

Direct responsibility for NACA's 10-1000 project of vertical flight is assigned to Charles H. Zimmerman and his associates on "three platforms" (AVR Apr. 75 p. 46) and development work

on the Lockheed and Convair VEHOL configurations, both at Langley and at Ames Aeronautical Laboratory (AVR Apr. 26, 1974 p. 50).

## Flaps and Vanes

NACA's test model is dynamically similar to airplanes in the Cessna 240 or Vickers Viscount category, although it represents an airplane smaller than either one. Passenger capacity of the full-scale airplane could be 40 people.

Most of the hoisting vanes and the wing are submerged in the dipper from the four propellers, separated with thrust axis parallel to the fuselage centerline. Eight 90-deg. vanes are evenly spaced in a circle above the wing surface, but both of the model were made with eight additional vanes below the wing, but these were later discarded as unnecessary.

There is a full-span plan flap of 65% chord that can be deflected through 90 deg. for the hoisting condition. Leading quarter of this flap is hinged in a control surface.

Natural position of the nacelle for hoisting is in a plane at 45 deg. to the wing chord plane. During transition flight, while flaps retract from 90 to zero degrees, the nacelle rotates forward through 45 deg. so that it is perpendicular to the wing chord.

From that position it retracts by pivoting outward as a parallelogram configuration and fits into a station on the upper surface of the wing. This station was designed for optimum



WING SECTION with vanes extended shows geometry of retractable vanes below.

model conditions, and is not suggested as optimum for the full-scale airplane.

Control system differs from conventional aircraft because there is no cable from air dipper to react against conventional cables, elevator or ailerons.

Rudder of the model during hoisting are the trailing-edge flap controls, moved differentially. If these vanes surface are operated together, they act as elevator and control the aircraft around the pitch axis.

For roll control the total pitch of the two outboard propellers is varied differentially, thus produces a change in propeller thrust line, moved by six vanes, becomes a difference in lift to produce a rolling moment.

A fixator cone was used for the flight tests. In addition to the thrust plate, one was operated by the rudder controls, and the fifth was a straddle to hold on the vane cable if trouble developed in flight.

The standard techniques developed for free-flight tests were used, model tests were made within in the large room used at Langley, and often tests made outdoors in a clearing in the woods.

Vertical takeoffs and landings, hovering close to the ground and hovering at a considerable height were programmed during the tests. An artificial stabilizing device was used during some of the tests to increase damping, in pitch.

Flown quickly were covered from pilots' comments from motion pictures of the flights and from measurements made from the motion pictures.

## Takeoffs and Landings

An upflow at the horizontal tail caused the only takeoffs made with the model; the tail tended to rise and the model accelerated forward before it left the ground.

Then was curd in subsequent flights by dropping the position of the horizontal tail in the fuselage centerline; it had been originally mounted well up

## How NACA Applied Vanes, Flaps to VTOL Model . . .



RETRACTED VANES fit within vanes in upper surface of model wing.



UPPER AND LOWER VANES, right early tests used in early tests of model.



FINAL CONFIGURATION of VTOL transport model used only upper hoisting vanes.

the fin and giving the tail a negative incidence of 15 deg. and an up elevator deflection also of 15 deg. This, says the NACA report, effectively eliminated the tendency for the tail to rise.

The low-set tail made takeoffs and landings simple and easy. If the model were properly trimmed for hoisting flight well off the ground, then as it moved to left the ground it still showed a tendency to move forward. This was

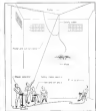
attributed to a slight reduction in the turning angle of the dipper, which added the force vector forward a little.

In a full-scale airplane, this would not be difficult to control, because the pilot would have a proportional control system. Model tests were all made with fixed-control systems, pneumatically operated to give either zero or full deflection of the surface.

Violently variable pitch conditions



VTOL TRANSPORT MODEL hoists in clearing during vertical flight tests.



TEST TECHNIQUE requires five men free to fly the model, operate power and maintain safety. Tests were made indoors and out.

showed up in hovering flight well off the ground. They considered pitching and longitudinal motions which gave the model a tendency to pitch nose-up if it moved forward, or nose-down if it moved backward. But it also had a tendency to nose forward if it pitched nose-down.

These two sets of motions produced a three-state stability. If the model starts to nose down, it also moves forward which makes it then pitch up and then stops the forward motion.

If dropping is insufficient, and the plane rotates in right, this apparent static stability can turn into an unstable condition. Apparently the damping in

pitch and forward motion were not strong enough to keep the model from becoming unstable.

Even though this behavior was unacceptable compared to other flying models, the pilot could control the craft in pitch. Here, as in the hovering condition, the control of a full-scale airplane would be easier because the angular velocities would be smaller and because the pilot could sense motions more and apply corrected control more rapidly.

NACA says these flight conditions might be considered acceptable in an emergency condition, such as failure of the autopilot.

Use of the pitch dragger changed the picture completely. The unstable condition changed to complete stability, and the model would fly satisfactorily without manual control from the pilot.

Yaw control was weak, according to the pilot, and particularly noticeable when the model was disturbed by air turbulence. Rolling the model caused some yaw, which troubled the yaw pilot because he couldn't counteract it effectively.

Roll was controllable in spite of the tendency for the roll to diverge. The roll pilot was troubled by effects of yaw as was the yaw pilot by the effects of roll.

#### Hovering Near the Ground

The pilots had to fly the model every second while it was hovering near the ground, because even a small disturbance would make the model lose enough height to touch the ground. All flights were made with the pitch dragger.

There was no noticeable ground effect on control effectiveness, although the model did tend to nose forward as it neared the ground. This was caused by applying elevator trim as the model descended altitude.

Controls, the stability and control of the model were as good near the ground as they were well above it, according to the NACA.

#### Developments

Hovering flights matched the findings at about a 15-deg angle when the lower oscillating vanes were attached, and at about 20 deg when they were

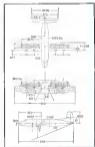


FIGURE VIEW. Dimensions in inches.

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1000-1-2	11	1	1	1000-1-2	11	1000-1-2	1000-1-2
1000-1-3	12	1	1	1000-1-3	12	1000-1-3	1000-1-3
1000-1-4	13	1	1	1000-1-4	13	1000-1-4	1000-1-4
1000-1-5	14	1	1	1000-1-5	14	1000-1-5	1000-1-5
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1000-1-21	30	1	1	1000-1-21	30	1000-1-21	1000-1-21
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1000-1-32	41	1	1	1000-1-32	41	1000-1-32	1000-1-32
1000-1-33	42	1	1	1000-1-33	42	1000-1-33	1000-1-33
1000-1-34	43	1	1	1000-1-34	43	1000-1-34	1000-1-34
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1000-1-37	46	1	1	1000-1-37	46	1000-1-37	1000-1-37
1000-1-38	47	1	1	1000-1-38	47	1000-1-38	1000-1-38
1000-1-39	48	1	1	1000-1-39	48	1000-1-39	1000-1-39
1000-1-40	49	1	1	1000-1-40	49	1000-1-40	1000-1-40
1000-1-41	50	1	1	1000-1-41	50	1000-1-41	1000-1-41
1000-1-42	51	1	1	1000-1-42	51	1000-1-42	1000-1-42
1000-1-43	52	1	1	1000-1-43	52	1000-1-43	1000-1-43
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1000-1-45	54	1	1	1000-1-45	54	1000-1-45	1000-1-45
1000-1-46	55	1	1	1000-1-46	55	1000-1-46	100

<sup>a</sup> These temperatures include enough time for any existing bulk heat continuously up to 40°C, as was found with an additional cooling.

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All specimens have been degraded to 140L, 40-4500 and 140L-200-01 which enables crushing up to 130% or greater, 10% or 10000 lb., and -120°C to 1000°C, and will deliver full rated load under these conditions.

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First, with the flat console wing vehicle showed that the craft would hover at zero degree incidence; pitch flat for lift, both upper and lower surfaces were symmetrical, and there had to be curved airfoil shapes instead of curved flat planes. Such a system would be much more difficult to construct.

Positive wing reinforcement might be, as other was, to reduce the pitch angle of the fuselage.

Monitors, sockets at the 7:11 h. Tunnel thrushes are working on another approach, using modified plans and slotted flaps to turn the slipstream through 90 deg for vertical lift. With slotted flaps and a single aileron, one mounted above the wing, the group has calculated that vertical takeoff could be attained with an initial fuelage attitude of 16 deg, and at airspeeds as high as 90% of the total thrust.

First NACA report on these tests is Technical Note 1440 written by Louis F. Tests and Edwin E. Davenport of the Langley low-flight tunnel section. NACA has prepared a supplementary information picture of the tests which is available on loan from NACA headquarters in Washington.

Background to an understanding of the thermal effects of hypoxia flight is presented in a survey booklet available from New York University.

The volume was prepared by Dr George Gerald, assistant director, Research Division, NTU College of Engineering, and George T. Hayes of Stanford Research Institute. It includes summaries of new papers presented last December at a symposium of the American Society of Mechanical Engineers (AW Dec 13, 1956, p. 13).

Topics include effects of supersonic flight on fuel cooling and other systems on structures and other structures, research aircraft design and lessons learned in high-speed, high-altitude flight.

Copies of the survey can be obtained from the Office of Information Services, New York University, University Heights, New York 53, N. Y.

Technical highlights of General Electric's Ramjet Project, a two stage rocket development of the proven WAC Corporal and the ex-Germans V-2, have been announced in a new company bulletin.

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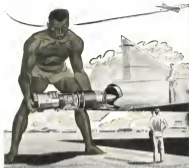
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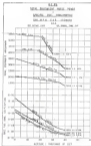
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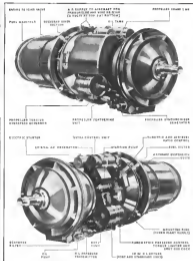
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Basically the engine has a sea-level potential of about 3,000 hp, but by supercharging the engine, that figure is lifted to a constant 4,000 hp from sea level to 20,000 ft. At the higher cruise altitudes on the order of 10,000 ft., available cruise power from the engine is approximately 1,500 hp.

This cruise power rating at altitude was one of four considerations governing the design of the B.E. 25. The others were:

- Specific fuel consumption should be

equal to the best compound piston engine.

• Takeoff power should be independent of altitude and air temperature at any aspect in the world.

• Design exploitation of the turbo-prop demands the ability to produce large power for small bulk and weight.

The B.E. 25 is a two-speed engine and is referred to as a supercharged turbo-prop by Bristol.

These Bristol figures confirm earlier data published here (AWE Dec. 19, 1953, p. 17; Oct. 25, 1954, p. 11).

Based plans to produce the engine in a complete powerplant package, with accessories, cooling and the de-iced-

lead 16-in. diameter four-blade propeller was read on Bristol's Phantom 735 brochure.

Under cruise conditions, prop tip speed will be about 700 ft./sec, which is expected to make for a very low noise level.

Present size of the B.E. 25 twin-speed compressor at 19.4" diameter is approximately 9 ft. long, 40 in. in diameter and weighs 3,200 lb. dry.

Reduction gearing will be the same and on the Phantom a two-stage propeller system.

It is possible to see two gear sets Bristol, because of the turbocharged power at any altitude.

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## Icing Spray Rig Tests Helicopters

Helicopter performance under icing conditions is being studied in a unique outdoor spray rig in Canadian experiments of the National Aeronautics Establishment.

Twenty test flights were made with a Royal Canadian Navy Bell HTL-40 helicopter. The craft flew in a simulated icing cloud produced by a gigantic spray rig, and its natural supercooled fog and light freezing rain.

Unfavorable weather and resource

problems delayed development of apparatus to simulate wing conditions and shapes of the ice formations on rotor blades, but much useful data has been determined on the effects of icing on helicopter blades.

The ground spray rig, requiring careful design because of the high wind loads on a top-hat streamer, was developed and constructed in the Ottawa branch of the Dominion Bridge Co. Ltd.

has been for at least one to three years. We decided that it was best to bring a graduate engineer here to meet this continuing problem."

Remember the oldest engineering school in the country, probably will establish a board of advisors for the graduate center. The board will be a group of Hartford men, and work under the RPI board of trustees.

## NYU to Offer Nuclear Degree

Master of nuclear engineering degree will be conferred on graduate students who complete New York University's College of Engineering course in nuclear engineering.

One of the first such courses in the country, NYU's graduate program will begin this fall. A substantial nuclear reactor is planned for the University's campus, if the project is approved by the Atomic Energy Commission. AEC and NYU officials have already entered this phase of the project, and construction could begin on the reactor this summer.

Nuclear engineering is one of the specialized courses to be available to students after completion of a basic

## RPI-UAC Co-Sponsor Engineering School

Graduate engineering education will be brought to the Hartford, Conn., area in a unique plan co-sponsored by Rensselaer Polytechnic Institute and United Aircraft Corp.

The program is set on a multi-phase training course, but a completely separate, graduate-level branch of RPI to be located in Pratt & Whitney's Fox, wast facility, now being used for nuclear powerplant development by the engine division.

RPI faculty will staff the new school, aided by qualified scientists and engineers from United Aircraft. Programs will be strong in mechanical and electrical engineering, and applied mathematics.

Last year's enrollment of 206 is expected in the expanded branch of RPI. UAC's expansion work center to be situated in Fox, from Hawthorne Stended Division and the company's research department. Ultimately, an Hartford area resident will be able to attend for a master's or doctor's degree.

UAC, however, president of UAC said "I'd be working on campus in Hartford just away to graduate school, we

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The ball/bearing screw principle is the same as the ball/bearing screw principle. It's the ball/bearing screw principle that does it.



Like rollers on a track, the balls reduce the friction between the screw and the nut, making the screw turn more easily.



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count is engineering success, also making this fall. The engineering success count is based on students who want to continue in research and development and is a basic long-term program devoted primarily to research and development in modern engineering. Many universities of mathematics, physics and chemistry feature the engineering success count.

## Cornell Wind Tunnel Passes Busy Month

The large wind tunnel of Cornell Aeronautical Laboratory has set a new testing record at 4371 hours during the month of May. No other known wind tunnel has ever done as much testing a laboratory, spokesman said.

The tunnel's mark put the laboratory within 311 hours of setting a 4,000 hour record for the fixed size ranking (see 30).

Over and above the time logged by the Air Force and aircraft manufacturers, the laboratory did 361 hours of its own research on the Bell X-1 model and calibration and technique development.

The highest previous record was 4165 hours set last October.

Research during May was performed on 10 different programs, including overseas stability research for the U. S. Air Force and high altitude and test some further studies. Companies that had work in the tunnel for testing were North American, Lockheed, Doug-

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### Telling the Market

**Automatic line guide** includes comparison of bond and preferred shares from *Edgar, Ager, Swartham Co.* 2137 W. Taylor St., Chicago 12, Ill.  
**Monitoring tapes, vibrations and shock controls** to IAN and MIT, specs, Catalog AB 35, T. R. Free & Co. Inc., Elm Street, Dennis, 200 Central Ave., Haddonfield, N. J. Specialized laboratory facilities for advance, all types radio selection and comparable corporate units, *Radio Aircraft Corp.*, Newton, Bucks County, Pa.

**Five carboxylic acid units** with aluminum handles, *Morgante Mann Machine Co.*, 187 E. Florence Ave., Minneapolis, Minn. Thermal engineering data brochures, *Comp-Gard* thermocouples and motor parts, *Installoy Sales Co.*, 180 194 E. 34th St., Akron 8, Ohio. Punch and die catalog, *Whitney Metal Tool Co.*, 702 Forbes St., Rockford, Ill.

**Efficient cutting process** for complex in resistant cast parts including many wire fittings, *Howard Foundry Co.*, 1700 N. Kansas Ave., Chicago 11, Ill.  
**Catalogs?** Into streamlined general control instruments, *Decker & Puma Co.*, 307 Jackson St., Madison 5, Wis. **Good-ford** patterns for investment castings, *Hoffman SC 170*, Surface Construction Corp., Advertising Dept., Toledo 3, Ohio.

**Promote** qualities of common strip-plate plastic in areas where industries, materials are used, *R. M. Edgemoor Corp.*, Industrial Sales Division, Camden 2, N. J. Self-lubric threads for bolts, screws, studs and turnbuckles, *Starlec Inc.*, 251 Clevel St., New York 11, N. Y. **Servolux** glass for transcribing info and solution in 7.32 V incandescent tungsten based, *Servo Corp. of America*, 2420 Jerome Ave., New York 10, N. Y.

**Needle continuous-flow** making devices for making medicament photo copies, *Purcell Photo Products Inc.*, Sheolux 1, L. N. Y. **Methograph** drafting instrument is stated to create, transfer, duplicate and transfer drawings from flat scans, *William Co.*, Box 578, Annapolis, Md. Guide to use of *Moore* Corby chronocycle decoders for timing equipment subject to high-temperature, high-pressure service, *Mintel & Thurst Corp.*, New York, N. Y.

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analogies of Quakering hydrostatic seals, filler and samples, Minnesota Rubber & Gasket Co., Dayton, OH, 3610 Woodside Ave., Minneapolis 16, Minn. . . .

Socket screw products data sheets, Bristol Co. Socket Screw Division, Whiteberry 28, Conn. Firm also issues ballistics cutting methods and controls used in making bonding instrument charts.

Supplied Drilling, 16-page booklet, defines method used to sink 90-95% of the number of hours needed for a given work volume; J. H. Burges, American Machine & Foundry Co., General Engineering Laboratory, 11 Bruce Place, Greenwich, Conn. . . .

List of over 100 welding and cutting technical reports, tech. safety leaflets, slide films and movies, Air Reduction Sales Co., 66 E. 42d St., N. Y. . . .

Procoater supplies catalog and buyers guide, Aulley & Richards Co., Inc., Newton Highlands 51, Mass. . . .

Rappaport OV miniature constant velocity universal joint technical data, Gear Cranking Co. Joint Division, 3900 Chestnut, Detroit 11, Mich. . . .

Lead lined machine cable for space or heavy, Rubbers Associates, 1715 W. Florence Ave., Los Angeles 47, Calif. . . .

Layout Tapes for Industrial Planning in transparent and opaque films, Lubbert Type Co., Inc., 410 Atlantic Ave., Rochester 9, N. Y. . . . High-

performance magnetic couplings and frequency multipliers, American Research & Manufacturing Corp., 4114 Del Ray Ave., Bethesda 14, Md. . . .

Silicone rubber finished high-pressure wire and cables, Philadelphia 19 194, General Electric Co., Wire & Cable Dept., Bridgeport 2, Conn. . . .

Isoprene spoked bearing rod ends, bare since mating from 1 in. through 11 in. in axle and female roset, Catalog 435, A. W. Conrath, wire roset, Spinal Bearing Corp., 435 Woodland Rd., Stamford, Conn. . . .

Dreadnought RB brass-counting dial for mounting in 2 in. shafts, Data Sheet 5676, Helmer Tool-and-Die Division, Service, Helijet Corp., Meriden 5, Pasadena, Calif. . . .

Complete line of the springs and mechanical solution tables, Daily Machine Specialists, Inc., 1090 S. Laticone Ave., Chicago 54, Ill. . . .

Red Bone Model CCR32 in universal rotary gear driving machine, Bulletin 835-4, National Branch & Machine Co., 5608 St. Jean Ave., Detroit 11, Mich. . . .

Five patch tools, including American Standard 30-day, evaluate five patch system, Illinois Tool Works, 1501 N. Keller Ave., Chicago 39, Ill. . . .

Automatic lubrication systems for machine tools, Bulletin 5410, Fabcon Engineering Corp., 1514 E. 46th St., Cleveland 1, Ohio. . . .

## Publications Received

- **Support Shop Operations by Lufkin**, A. Lufkin & Co., University, Boston 10, Division of Aviation, Irvine, Ill. Free of charge, upon request, 11 pp. Also in literature necessary to organize and operate an overhaul shop and maintenance unit.
- **Defense Materials Systems**, by The Army and Defense Services Administration, Department of Commerce-Volubility from Government Printing Office, Washington 25, D. C., in Department of Commerce, Field Office, 216, 41 pp. Handbook, organized in questions and answers form, the plan of the Defense Materials Systems under which contractors are required to operate in production of contracts.
- **U. S. Military Doctrine—Dive O**, Smith-Bing, Gov. USAF—pub. by Lufkin, Irvine & Co., 14 Benson St., Boston 5, Mass. 53 pp. 126 pp. The author comments on our nation's policy of the United States.
- **The Lonely Sky**, by William Rodriguez with Josephine Haines-Pub. by Henry Holt and Co., 161 Madison Ave., New York 17, N. Y. \$1.95, 116 pp. Story of one of America's top test pilots.
- **The Data Bases**, by Fred Paulding, Pub. by Information Systems, Inc., 464 Fifth Ave., New York 15, N. Y. Hardbound 100 pp., \$2.50 paperback, 191 pp. Story of the development and services of R/W Spectrum 917.

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## PRODUCTION

### F-102 Fits Into Cook-Craigie Pattern

By Irving Stone

San Diego—The F-102 delivery program is being approached in a new approach in aerial planning for production.

This phase, the first programmatic under the Cook-Craigie plan, was given special design and production engineering consideration by Convair Division (Division of General Dynamics Corp.).

Production was not limited to mass electronic interconnect systems. Instead, one was to provide a design, manufacturing and testing scheme, which would permit a growth model and production rate, should it be so required.

Key feature in this approach is that production planning and control is in place along with engineering, from the very beginning of the project.

Initial studies which established the pattern of manufacturing for the F-102 were extensive. All elements such as flow space, sequence, lead time on growing and production costs, and other tool and material costs and various other factors were brought in for close scrutiny. Each segment of manufacturing was outlined in detail prior to the start of the tool planning program.

In addition, the system was built to permit for modified operation in engineering, manufacturing and testing areas. This close liaison would to-



ward achievement of the most flexible manufacturing plan to meet changing requirements and permit the volume to be held within the close dimensional tolerances established.

Under present procurement, Convair equipment point out the concept was to build two experimental models, then phase into the production program in most cases with an experimen-

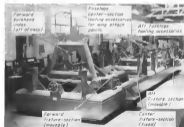
#### Cook-Craigie Plan

To avoid the biggest fuel crises when large quantities of new military aircraft must undergo extensive "debugging" before they are combat ready, USAF last year adopted the Cook-Craigie procurement plan (AEP Apr. 12, 1964, p. 12).

Known formally as the Initial Low Rate of Aircraft Production Plan, it provides for building output to a relatively low level for 18-24 months while the delivered aircraft are "weaned out" in an extensive test program. During this period, major systems, engine and component problems are worked out and necessary modifications created into the plane's production pattern.

The plan eliminates experimental testing, prototypes and drawings. Fast aircraft are built with production-type testing and from production drawings.

The plan sets its informal name from Gen. Lawrence Craigie and Gen. Cook, who, together with Gen. Donald Pratt, are given principal credit for getting it into operation.



P-102 FUELAGE MOUNTING FIXTURE was built by Shuman Tool & Engineering Co.



**P-103 COMPLETE WARD** is Hardwood having future load capacities of 10 H/dimension units and 12 K/dimension units. Note loading area on sides of ward bench.



ALL WING TO FUSELAGE attach points are bored, and landing gear attach points are bored and fixed in this fixture. Fixture shows left-hand panel in place.

ing design which was not broken down for naval efficient manufacture.

In many cases, result was a need for considerable redesign, new factory floor layout and retooling as the program went into production.

Because looking for the F-103 was formulated to support an anticipated accelerated rate of production (al- though looking to the high rate might cause gradual), higher looking ex- penses was accurately revealed. But this would be far outweighed, should the accelerated rate be put into effect, by the cost and time normally involved in substantial reductions of the structure for mass production.

Even at an early stage of an accelerated building, the permanent-type high-production tooling permits the plane to be built with less direct man-hours, leading to a cheaper airplane sooner. Compare its effects on:

Also, this type of permanent tooling allows interchangeability of structural components and other items to be achieved virtually from the start of the program. This is a production aid to simplify assembly, also eases the job of servicing the plane in the field.

Designs of the 1 162 structures selected by design performance: prioritized the conventional approach of assembly

Accordingly, the authors was broken down into subassemblies of such size as to provide maximum accountability for work within the waste and low to utilization of its most primary items (equipment brackets, wiring etc.) is feasible.

Configurations of structural concepts as well as use of the infrastructure, were chosen to permit the use of software programming methods as much as possible.

Another consideration in the use of adhesives such as in the wing was predicated on the making of the integral tanks with adhesive bonding. This meant that units had to be located in areas to be accommodated by service fuel inlets for service volume.

## How F-102 Is Built

Building requests for the T-102 in  
subject are indicated, unclassified

Cockpit area is reinforced by attaching outside duct segments to the cockpit skin. The skin duct panel is first attached, within a frame, to cockpit flooring and front and rear pressure bulkheads. Windshield frame is assembled to this same frame.

This seat is then placed into a free-standing frame which permits the user to be tilted to the most advantageous position to work most efficiently, both the cockpit and rear wheel well area.

This lever-type fixture controls the dimensional accuracy of the attachment, maintains the external configuration of the articulator when this is into the integral dent structure in the linkage across all of the occlusal

Next series of assemblies, constituting the center fuselage barrel (started ahead of the aft section because of flow time involved) is manufactured in four panel sections (two on each side) with integral decking as part of the structure.

Three quarter sections proceed to a common feature which notes respectively, the two left-hand components and two right-hand components, small tenebrids. This is done by moving the shifter/quarter forward to the marking position with the corresponding for each quarter sections.

Two crabs in two half-barrel size pens still affording full working access to interior area.

After parallel operations on left- and right-hand half sections are completed the center working platform jings out of the way and the two half sections are rolled together for mating at the vertical anastomosis.

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for bringing the four sections into a single unit.

The after fuselage section now comes into the picture. The vertical fin becomes integral with the after fuselage because it has fast rear structural connection with bottom portion completing the fuselage main structural members. The latter come to the attaching feature in aircraft form and are fastened together and to the fin structure.

The after fuselage fin structure progresses to the next operation before, where the wheel well area is assembled and the section which attaches to the center fuselage are joined in a continuous bottom longitudinal and enclosing panel section (under the fin forward edge).

After the nose, center and after sections have given satisfactory conditions for structural structure taking wing, nacelle, overall mating of the fuselage is accomplished by joining these three segments in a single feature (built by Hamilton Tool & Engineering Co.) where the relative sections in level and the nose and aft sections are brought to fit for bottom cap.

### Maintaining Control

In addition to maintaining overall contour and alignment, precise control is given to the relationship of the fuselage-to-wing attach points, which are located on the center and aft fuselage barrels. Control of these critical points is maintained through a series of operations leading to the

raising level, by use of leading sections, maintaining wing fitting attach points.

These leading sections, built with a pointed type base, are attached with full use prior to the corresponding fuselage members and raised with them through the entire fuselage assembly.

Wing base, bottom line and station line positions of the attach holes is maintained by relating these holes to the fixture points by means of specially aligned fixture gages.

Cockpit section is aligned with center section by utilizing the rear line and rear entrance points and rear cone attach points.

### Wing Work

Wing panels are made up of two major subassemblies comprising a far forward and an after bulk wing section.

After these subassemblies have been completed including application of adhesive material for a fuel-tight joint, they are baked at 150°F for curing the adhesive.

The after wing bulk assembly is then joined to the leading edge assembly which includes the aluminum wing-to-fuselage attach point, on span 6 (other wing attach points are on span 2 and 3 in forward wing section and on span 4 and 5 in the aft section).

Forward and after wing sections are then joined in a common feature, utilizing specially set points which have been progressively maintained.

Prior to this mating operation, the



### Million-Dollar Tunnel

Chas. Varghese was wind tested in its Dallas, Tex., plant, built for a little under one million dollars, now developed for working the cramped end of the flight spectrum. With its velocities up to 200 mph, Varghese engineers can study behavior of fighters and missiles through the critical low-speed stability range as well as at typical approach and maneuvering speeds. Test section is housed in the side building, the 1,500-hp electric motor and drive fan are in the main-diameter portion of the tunnel just outside the building. Pipes along the top spray cooling water down the interior nozzle, and the concrete wall below catches the drop for recirculation. Picture was taken from a Bell helicopter built in a nearby city.



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The same engineering, precision, reliability that they have applied to CO-2 and CO-2 systems would give you the comfort, convenience, durability can be applied in your own home. Dependable on your design, and performance you can get by writing and cost saving yourself with TECO's complete non-adjustable furniture.

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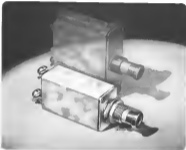
2021 N. Dixie Dr. • Hybrid, California  
Sales • Executive • Wholesaler



## New KLIXON

### Miniature Aircraft Circuit Breaker

with Conventional Push-Pull Button Action



#### Two D6761 Breakers Fit into Space of One M5 Type

This New Klixon Miniature Trip-Free Circuit Breaker Gives You Three Outstanding Advantages —

- ▶ *Space efficiency* — thermal element with double break and wiping contacts assure permanent precision calibration.
- ▶ *Conventional button action*, i.e. pop out and indicate on trip plug — ... push to reset.
- ▶ *High rupture capacity* — successfully interrupts over 2500 amperes, 120 volts, AC, 400 CPS, and 9000 amperes, 30 volts, DC.
- ▶ *Outstanding performance* — like its predecessor, it is designed

to meet all operational requirements of MIL-C-5529.

The D6761 is now being tested for production in ratings from 5 through 35 amperes. Send for additional technical bulletins.

KLIXON — The original aircraft circuit breaker

## KLIXON

MITAL & CONTROLS CORPORATION  
SPENCER THERMOSTAT DIVISION  
3916 FORT ST. ARLINGHAM, MASS.

wing goes to a maintenance base and main fuselage (also constructed by Hamilton where the attach bolts previously mentioned) are brought up to full size. Control of this fuselage is established by use of specially shaped fabric gages identical to those used on the fuselage.

From the base and remote operations the wings are transferred to a station and pressed into shape, removing bulging, electrical and other defects, then finishing main landing gear (as set in).

Next, the wing is placed on a dolly and rolled into position for joining to the fuselage. This dolly incorporates vertical and horizontal positioning to facilitate the connection of the dolly wings to the fuselage.

Either wing-to-fuselage joining, including attachment of main bolts, electrical connections, fuel lines, etc., is completed for incorporation in these hours.

Key personnel in the production program include: A. P. Higgins, works manager; P. G. O'Brien, factory manager; W. P. Woods, chief tool engineer; and V. F. Corvino, chief of machine tooling control.



#### Searchlight Furnace

Temperatures above 7000° are being produced in two solar furnaces constructed by Corvino engineers from scrapable and wrought materials. The two 60-in. furnaces, plus a third searchlight in reserve to a source of heat energy, augment Corvino's 120-in. solar furnace that has been firing metallic composites, glasses and other structural materials for over a year. Concentrated exposures, held in a special drill chuck, are moved into the focal point for tests. Most materials melt in seconds and some specimens shatter under thermal shock at this point in the focus. Temperatures of 7000° compare with 3500° produced by electrolytic melting furnaces. An actual temperature of 5500° is obtainable under special conditions. Temperature of the sun's surface is 5500°.

## Every overhaul requirement for your business airplane!



MAJOR AIRFRAME OVERHAUL, and engine change taking place in one of the 600,000 sq. ft. hangars. Services available include installation of major engines, modified wings, and new complete systems.

Let our specialists maintain your business airplane in top condition. Experienced mechanics provide every aspect of aircraft servicing, from thorough 100-hour checks to complete modernization. AirResearch is the only company at Los Angeles International Airport with CAA approval for annual refueling of your airplane.

A complete engineering department, the finest intensive stylists and superb craftsmanship assure you of top quality if your problem is comfort, speed, range, payload, power or all five.

#### Try our rapid and efficient turn-around service!

TYPICAL AIRCRAFT WE HAVE MODIFIED OR OVERHAULED —

Douglas DC 3, Super DC 3, DC-4, DC-6 and A-26 — Cessna 340 — Lockheed Lodestar — North American B-25 — Martin B-26 — Beechcraft



AirResearch Aviation Service Division  
Los Angeles International Airport, Los Angeles 45, California



RECREATIVE, CUSTOM ESTABLISHMENT installed by AirResearch in a Cessna 340 owned by the Pilatus Privateers Club. Comfortable appointments are combined with practicality.



NEW RADAR AND ELECTRONICS CENTER has been completely installed in the cabin for business aircraft. CAA certified for Class I and II.



ANY TYPE PATTERN—metal, clay, wood, plastic or combustible—can be used in ceramiccasting, thus reducing initial costs.



SMALL PARTS as well as those requiring several hundred pounds can be made.



Pouring metal in ceramic molds.

## Ceramicasting Gives Close Tolerances

By Allynne W. Jessup

Lebanon, Pa.—Castings with tolerances and finish comparable to those obtained in the lost wax and investment cast processes are produced by an economical and fast method being developed by the Lebanon Steel Foundry.

Any type of pattern can be used in Lebanon's "ceramicast" process, thus eliminating the expensive dies required by other precision casting. For runs up to 1,000 to 2,000 pieces, or for parts on which frequent design changes are anticipated, "ceramicasting" promises to be very economical.

Advantages of the process for fine castings as explained by Lebanon's Plant Manager Thomas S. Quinn are:

- Low cost of the initial pattern through the use of any type of pattern

—wood, plastic, metal, metal and plaster, jobbing wood in dirt. Molding costs also are low, reduced considerably when the process is established on a full production basis.

- Speed with which castings can be turned out. Castings can be produced the same day that a pattern is delivered to the foundry. Small quantities can be made in a matter of one to two hours.

- Ease in making design changes. Because line and pattern not requiring set person days are possible in the "ceramicast" process changes can be made quickly and at limited cost.

- All known metals can be cast. This includes castable steel, conventional low-carbon steels, nickel-chromium, stainless steels and cobalt base superalloys.

- Fine tolerances produced. Tolerances run from  $\pm .002$  to  $\pm .004$  inch per inch

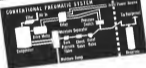
and  $\pm .013$  to  $\pm .017$  inch over seven inches. Tolerances across a parting line would be approximately double. But usually this can be cut down by sanding one part of the mold a flat side. Production of knurled parts is feasible.

- Unlimited use of coatings. There is virtually an upper limit short of possibly several hundred pounds for the top size of casting which can be made by this method.

### Aircraft Parts

Lebanon Foundry considers the process advantageous for the production of air engine parts (manifolds, bearings, blades), landing gear parts (brake backing plates, struts, shock absorber housings) and various structural members where firmness allows can be used. A typ-

## Cornelius "PACKAGED" PNEUMATIC SYSTEM SAVES WEIGHT and SPACE



\*The Cornelius Compressor, Model 130, 20CFM, 3000 PSI, is used in the McDonnell F4U-3 and F4H, North American F5D, F2-3 and F2-4, Chance Vought F4U-3, Grumman F6F-3. Also an order for the Lockheed P2V, Grumman S2F and Martin F5M. Thousands of service hours under all operational conditions is proof of outstanding performance.

The Cornelius Model 130 compressor\* is the heart of the complete Cornelius "packaged" pneumatic system which includes inlet air filter, starting relay, radio noise filter, moisture separator with automatic condensate dump and heating element, back pressure valve, check valve, relief valve and pressure switch.

**Compact Design Saves Space.**—Turbine air supply system occupies only slightly more space than compressor alone in conventional system.

**Weight Savings.**—If 4 pounds or more are possible by eliminating separate system components, associated tubing, fittings and line connections.

**System Leakage is Reduced.**—to a minimum because integration of components removes possible leakage sources such as flared connections and o-ring sealed fittings.

**System Reliability is Assured.**—because each integral component is designed specifically to give optimum performance in combination with the other components.

**Time Saved by installation and servicing of one unit is another valuable benefit which only Cornelius "packaged" pneumatic systems offer.**

The Cornelius "packaged" pneumatic systems are available with either DC, AC or hydraulic motor driven. Please write us in order that a Sales Engineer may discuss with you the application of this "packaged" system as well as the many other pneumatic components which we manufacture.

THE CORNELIUS COMPANY 330 - 29th Ave. N. E., Minneapolis 33, Minnesota

PIONEERS IN THE DEVELOPMENT OF AIRCRAFT PNEUMATIC SYSTEMS



MOLDING material poured into pattern



MOLD is dropped from pattern, then...



FLAMED-OFF to eliminate shock.

al part adaptable to this casting process is a housing which splits into quarters which must be produced as positive castings because a flange prevents machining.

The master required to cast that to produce the part is another casting process requiring dies would be much more expensive.

This casting process, also, should be exceptionally suitable for Lathams because, to a degree, engineer. With an expensive pattern he can obtain cast parts quickly and economically, and in required he can make changes in his patterns, also without expensive die making.

Quinn thinks the new process will permit manufacture of many aircraft parts in ferrous alloys using little or no critical alloying materials. This was never a little the present trend of many engineers who say "we have to take the part out of steel."

#### American Method

Actually use of ceramic molds is a British development. Thus, however, the process has been looked to what amounts to laboratory scale Lathams in turning the process into a production operation under the direction of metallurgical Edward Vogel, who has improved pilot-plant operations for several months.

Vogel outlines the process of making the mold as follows:

- Preparation of the molding material. It is a mixture of the molding material (10/16 AFA fines and 120 mesh) and it is mixed with a catalyst ethyl ortho-alkylate. Speed with which the mold sets is controlled by the amount of ethyl ortho-alkylate used. If too much is used the ceramic material will set before it can be poured from the casting container.

- Pouring molding material into the pattern. This is done immediately after the binder is poured.

- Flaming off the alcohol. The molding material sets very quickly, usually within three or four minutes. As soon as it sets the mold is stripped from the pattern and set aside. This burns off most of the alcohol which is found as a result of the catalytic in the molding material.

- Firing of the mold. The mold is placed in a furnace at about 1500° F. for 30 minutes per inch of thickness to get rid of the organics. The mold is completely gas-free ceramic mold.

Besides being gas-free Vogel states that the mold is surface-free, free of gas bubbles, and that this has led to no trouble with hot tears. The mold is very collapsible, but crumbles easily under finger pressure. While clean and shatterproof is not as true as with sand, it is not difficult.

## Lumber Dealer Named To Defense Post

Paul M. Irving, a Washington, D. C., lumber dealer, has been appointed Deputy Assistant Secretary of Defense for Imports and Exports.

He replaces Randolph W. Wentz in the position in order to Assistant Defense Secretary Franklin G. Harter Irving, a member of the Lumber Industry Advisory Committee to the Secretary of Commerce, was president and board chairman of the Forest M. Young Co., wholesale and retail lumber dealer. A graduate of Yale, he served during World War II as a member of the Federal Lumber Industries Advisory Committee to the War Production Board.

## Pacific Air Force Takes Over 13th AF

Command of the 13th Air Force has been changed from the 1st Air Force to the Pacific Air Force.

Responsibility of the 13th Air Force is being expanded to the Far East area as well as the Philippine Islands. The Pacific Air Force was established last year to operate Air Force units in Admiral John S. Stennis' Pacific Command.

Major Gen. Sam Smith commands the Pacific Air Force. He was formerly Director of Information Services at USAF Headquarters.

## ACC Panel to Study Detroit Air Space

Apart from the Panel of the Air Commanding Committee, has scheduled public hearings at Detroit, Mich., beginning June 25, to determine the most feasible configuration, utilization of the airports existing and proposed, in the Detroit area.

The hearings are required, ACC said, as a result of an increasing need of the Air Force and Navy to relocate some of their activities now being conducted at Schofield AFB and Great Lakes NAS because of the inadequacy of present facilities. In establishing the relationship on other aspects of the Detroit area, the disposition of civil airports will also be taken into account the committee stated.

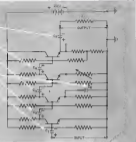
## Gage Checks Blades

Grooving gage for checking geometry of jet engine blades are not up to 10 different factors, parts can be changed on the spot, the manufacturer says.

The gage is produced by Windsor Manufacturing Co., Cleveland 14, Ohio.



New RC coupled, 4-phase transfer servo amplifier was developed for aircraft and guided missile applications. These small size of six 9-G Micro-miniature Tantalytic capacitors permitted size reduction to 48 sq. in. inches.



COMPACT SIZE, DEPENDABILITY, CREATE . . .

## New use for tiny G-E Tantalytic capacitors in subminiature plug-in servo amplifier

Six G-E Micro-miniature capacitors rated at 5 microfarads and at 4 volts are used by the engineers at Plastic and Electronics Corp., Buffalo, N. Y., in their new RC servo amplifier. The 3 1/2 by 1 1/2 inch dimension sizes of the tiny capacitors enable the amplifier to be assembled and encapsulated in plastic in a 1 by 2 by 3 1/2 inch space.

Five of the capacitors (C1 to C5 above) are used for coupling while the sixth (C6) is for bypassing.

Because the amplifier was designed for critical aircraft and missile applications, capacitors were needed which combined small size, high ratings, and reliability.

"We chose G-E Tantalytic capacitors because they were the smallest, most dependable units with the highest level of reliability," said General Electric Co.

high capacitance required for low impedance transfer devices," said Plastic and Electronics' chief engineer, Thomas L. Robinson.

If you have a design problem calling for an extremely small, high microfarad capacitor (particularly for transformer circuits) fill out the coupon below. We will send you complete specification data and descriptive information on G-E Micro-miniature Tantalytic capacitors. For specific application information, contact your nearest G-E Apparatus Sales Office.

General Electric Co.  
Buffalo 8440-06  
Schenectady 5, N. Y.

Please send me three Micro-miniature Tantalytic GEA 4005 and GEF 3405.

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Progress Is Our Most Important Product  
**GENERAL ELECTRIC**

## NEWS OF G-E AIRCRAFT PRODUCTS



G-E exhaust gas thermocouples are easy to install and service. They have proven in 4,000,000 hours of operation.

## G.E. offers prototype thermocouple systems for new jet engines in record time . . . without charge

General Electric is now able to provide a prototype gas thermocouple system for your second gas turbine without charge. Whether axial or centrifugal type, these systems can be designed to meet almost any requirements. Past prototype systems have been delivered for evaluation within 24 hours after date of request.

**Advantages of G-E thermocouples:**  
Manufactured by the G.E. Instrument Department in West Lynn, Massachusetts, your General Electric prototype thermocouple will have these advantages:  
1. Lighter weight because of self-supporting base—there is no need to install extra mounting brackets on the tail pipe. This reduces installation cost and weight.

2. Greater reliability—because of finer construction, G-E exhaust gas thermocouples are less apt to develop contact line failures.
3. Faster service problems—the thermocouple housing assembly and leads are cut of only 3 parts, which makes for easier installation and reduces chance of bad parts.

### Other construction

Every G-E thermocouple system is constructed with computered measurements made powder reduced in a vacuum steel tubing. This construction withstands ambient temperatures of at least 2000 F.

### Proven in Service

More than 6 million flying hours have already been logged with jet engines using G-E exhaust gas thermocouples. They are used both in systems that indicate and in those that automatically control the temperature. The temperatures are normally in the 2000 F range with transients up to and above 2600 F.

For further information on ordering a prototype gas thermocouple system to fit your requirements, see your nearest G.E. Apparatus Sales representative. Send in coupon below and check of "A" to get bulletin GPC 1297, for a rundown on the complete line of systems offered.



Exterior view of cartridge starter for jet engines shows main operating parts.



B-57 takes off after test run with General Electric cartridge turbo starter. Pilot is able to get immediate 100% dependable start at the push of a button. Starter torque output is relatively constant providing rapid start without damage to jet engine gas turbine.

## Cartridge starter turns over Martin B-57 jets fast for quick takeoff

A small General Electric cartridge starter that will start all the Air Force's Martin B-57 for a quick takeoff is now in operation.

The new starter, known as Model N-22, has a solid propellant charge which is ignited electrically at the push of a button. The rapid burning of the charge provides hot gases which turn a small turbine

wheel. This wheel is engaged through a reduction gear system and clutch to start the pump-jet engine power plants.

### Allows Take-Off From Any Airfield

Importance of the cartridge turbo starter is that it permits fast starts on places contained under one part of any airfield,

without ground power, since no ground power units are needed for starting. Every B-57 carries its own engine starting power. Further information on this starter can be obtained from your nearest G.E. Apparatus Sales representative, or by checking "B" on coupon below and mailing in for bulletin GEA-3622A.

## G-E transformer rectifier designed for reduced weight



All components of G-26 show G-E low transformer rectifier designed for easy inspection.

Converting a power line d-c on the General Electric Air Force B-36 are General Electric transformer rectifiers. The units are designed to offer a lightweight means for obtaining on-line direct current required for the d-c equipment and eliminate the long, heavy d-c bus and d-c generating equipment which would otherwise be required.

### Transformer rectifiers in your applications

These transformer rectifiers, as well as the other models now being currently produced by G-E, offer a lightweight, highly dependable, flexible source of direct current and require a minimum of space. Since G-E now covers a range of applications for 200 solid state power supplies ranging from 1 amp to 200 amps, both

regulated and unregulated. Regulation is accomplished by means of magnetic amplifiers. The output can be filtered to meet almost any ripple specification. Efficiency varies between 70% and 80% depending on readiness of operation and the type of load.

### Designed for your requirements

Regulated units can be paralleled with each other or with a d-c generator. Cooling is done by convection, or fan. Protective features such as under-voltage relays and over-voltage relays can be provided.

For further information on these new lines of transformer rectifiers, see your nearest G.E. Apparatus Sales representative, General Electric Company, Schenectady 5, N. Y.

## 400-cycle alternator meets tough guided missile demands

Developed to withstand the tremendous range of shock, temperature and atmosphere conditions encountered in guided missile applications, the G-E explosion resistant 400 cycle alternator meets rigid environmental and military specifications (MIL-E-22223). Rated up to 1300 volts, 12000 rpm, for output of 215 or 230 volts, the unit is designed to be driven by a wide variety of motor, turbine, and gas turbine drives.

The alternator can be readily coupled to a drive unit with an AND 1504 or AND 2000 mounting pad. Modifications of these mounting pads can be made to meet specific application requirements like use in very unusual or both construction and application, and can be manufactured

to produce more output when improved mounting only features provide when equipped with the AND 2000 mounting pad, the new alternator is a lightweight unit having an unusually high power.

To meet requirements of MIL E-22223 regarding altitude, shock, temperature, vibration, humidity, foreign materials, and outgassing factor, the alternator underwent extensive testing—a standard procedure for all G-E aircraft and aerospace motors.

For more information on how this motor can match your aircraft and aerospace problem, check "C" on coupon for GEA-3259B, and return to address indicated. Remember—your specifications are all that G-E engineers need to handle your toughest requirements.



New 400 cycle alternator passed rigid testing to meet exacting aerospace, shock, temperature, vibration, humidity, sand and dust, and centrifugal force demands. G-E offers hundreds of other types motors to meet any aircraft requirement.

Progress Is Our  
Most Important Product



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ELECTRIC

Mail to:  
Section A310-95  
General Electric Company  
1 River Road  
Schenectady 5, N. Y.

- ☐ "A" Exhaust-Gas Thermocouples, GEC-1297  
☐ "B" Aircraft Gas Turbine Starter, GEA-3622A  
☐ "C" New 400-Cycle Alternator, GEA-3259B

Name \_\_\_\_\_ Position \_\_\_\_\_

Company \_\_\_\_\_ ☐ For immediate project

Street \_\_\_\_\_ ☐ For reference

City \_\_\_\_\_ State \_\_\_\_\_







## NATO Fighters In Production

**SHARP CONTRAST** in British and Canadian fighter production is shown in photos comparing Hawker Hunter (left) and Canadair Sabre assembly lines (right). The wide-spaced Hunter line at the company's Blackburn plant follows standard British practice; the closely packed Canadair facility transmits U. S. mass-production techniques. The Hunter is still in development and output has been delayed to make design changes during production as these occurred in tight test program. The Sabre, which has just taken flight, permits such changes to be incorporated before and even after entry into a production building. The Blackburn plant, a former wartime satellite factory, now converted especially to boost Hunter output. Approximately 120 of the sweeping fighter are now being delivered to RAF.

**WELL OVER 1,200 SABRES** have been produced in Canada. Ltd. at its large Montreal facility supply forces from North America to other line. In addition to the T-16 it is also turning out Lockheed-designed F-111s and jet trainers and a massive manufacturing turnover at the Bristol Brit area. Canadair has been building Sabres since 1949, beginning with the General Electric J-47-powered version. Last year it switched to the Van Oostrop-powered Sabre F and B models.



**LARGE FLIGHT RANGAR**, receiving 747-100s at Cranbrook, Montreal, can receive 70 Sabres or T-119s or more 70 of these planes. Sabres in the foreground are painted with glossy BCFV camouflage, and less the 6-3 station wings developed by North American Aviation during the Korean war. The T-119s in the background also for the BCFV are powered by the Rolls-Royce Spey. Upstairs, the large control office, sales and service training schools and a dispatcher's facility for controlling movements of aircraft.

## Systems Development and The Ramo-Wooldridge Corporation

The Ramo-Wooldridge Corporation (except for the specialized activities of our subsidiary, Pacific Sensor-Systems, Incorporated) is engaged primarily in developing—and will soon start to manufacture—systems rather than components. For military customers our weapons systems responsibilities are in the fields of guided missiles, fire control, communications, and computers. Our non-military systems activities are in the general areas of automation and data-processing.

Emphasis on systems development has consequences that profoundly affect all aspects of an organization. First, it demands an unusual variety of scientific and engineering talent. A single systems development project often requires concurrent solutions of challenging problems in the fields of electronics, aerodynamics, propulsion, random phenomena, structures, and analytic mathematics. In addition, the purely technical aspects of a system problem are often associated with equally important non-technical problems of operational, tactical, or human relations character.

Therefore, competent systems development requires that a company center an unusually large proportion of its staff, experienced scientists and engineers who have

a wide range of technical understanding and an unusual breadth of judgment. Further, all aspects of company operations must be designed so as to maximize the effectiveness of these key men, not only in the conduct of development work but in the choice of projects as well.

At Ramo-Wooldridge we are engaged in building such a company. Today our staff of professional scientists and engineers comprises 45% of the entire organization. Of these men, 40% possess Ph.D. degrees and another 30% possess M.S. degrees. The average experience of this group, just the B.S. degree, is more than eleven years.

We believe the continuing rapid growth of our professional staff is due, in part, to the desire of scientists and engineers to associate with a large group of their contemporaries possessing a wide variety of specialties and backgrounds. It is also an indication that such professional men feel that the Ramo-Wooldridge approach to systems development is an appropriate one.

We plan to continue to maintain the environmental and organizational conditions that scientists and engineers find conducive to effective system development. It is on these factors that we base our expectation of considerable further company growth.

**POSITIONS ARE AVAILABLE FOR  
SCIENTISTS AND ENGINEERS IN  
THESE FIELDS OF CURRENT  
ACTIVITY**

**Guided Missile Research and Development  
Digital Computer Research and Development  
Business Data Systems Development  
Radar and Control Systems Development  
Communication Systems Development**

## The Ramo-Wooldridge Corporation

Dept. AW, 8820 BELLIAMCA AVENUE, LOS ANGELES 45, CALIFORNIA

## TITANIUM



What's this?

# WE'RE MAKING METAL BY PUSHBUTTON!

• The familiar sights of steelmaking are strongly absent in a titanium plant. The molten crucibles must not only be completely enclosed, but maintained under vacuum, to prevent contamination of the molten titanium by gases. And the crucible requires special cooling, otherwise it would melt with the titanium it holds.

In Mallory-Sharon's new titanium melting plant, production methods have been refined further, with all melting operations remotely controlled by pushbutton. This assures safety and provides the strictest control of processing possible. The result is consistently high quality and uniformity in the titanium and titanium alloy mill products which Mallory-Sharon produces.

Mallory-Sharon's technical leadership, in research and production techniques, is proof reason for you to call us in your applications of lightweight, corrosion-resistant titanium.

Mallory-Sharon Titanium Corporation, Niles, Ohio.

MALLORY  SHARON

## WHO'S WHERE

(Continued from page 9)

Paul E. Haggard, research and development director, Bell Telephone Corp., Canaan, N. J.

Robert A. Jurek, manager of antenna systems representing the General Electric Co.'s aviation and defense divisions into department, Schenectady, N. Y.

James K. Kenna, assistant engineering director, Avionic Systems Corp., a Teledyne Division, Hawthorne, N. J. C. E. Kline, chief engineer of the Utah Division.

Glyn A. Nell, project chief for data processing systems, Consolidated Packaging Corp., Staten Island, Franklin, Calif.

James W. Ruediger, design specialist in Ryan Associates Co.'s electronics equipment department.

Reggie V. Sabers, chief accountant, Dal

lin, New Jersey.

R. Sherman Platt, legal counsel, Solar Aircraft Co., San Diego.

J. George Rook, labor relations manager, Republic Machine Corp., Longbridge, N. Y.

Arthur Kennedy, superintendent of sales and traffic, Canadian Pacific Airports.

Carl Drexler, sales manager for both Velsco Research Manufacturing Corp. and National Electronics Corp., San Francisco.

John Eder, sales manager, T. R. Fox & Co., Electronics Division, Hawthorne, N. J.

Robert S. Fries, West Coast manager of contracted engineering for United Visual Products Inc.

L. Wayne Malone, Philadelphia-based sales regional manager for Kvaist Manufacturing Co.'s Government Products Division.

F. Glen Nichols, assistant sales manager, flight and engine instruments and Visual E. Air, assistant sales manager, flight control systems, Spaulding Co., Los Angeles.

John J. Lillis, Los Angeles district sales manager, Fox Aerospace, World Airways.

Frederic J. Mowatt, manager of Consolidated Engineering Corp., Buffalo, N. Y., aircraft sales and service center.

William D. Ferguson, assistant to the general sales manager, General Air Lines.

R. J. Talbot, director of sales development, Northrop Aircraft, Inglewood, Calif.

V. V. R. Reynolds, sales manager for General Airplane Co. of Canada, Aircraft Division of MacDonald-Roe Aircraft Ltd., Winnipeg.

John C. Christian, manager of plans and proposals for defense operations, Velsco Manufacturing Corp., Garden District, Cincinnati.

Charles Kowalski, vice president of Boeing Aircraft Co.'s research and development, Boeing Aircraft Co., Inc., Seattle, Wash.

Paul M. Segerson, vice president of technical sales service, L.O.F. Glass Fibers Co., Toledo, Ohio.

Lee B. Campbell, superintendent of production and design, Dallas Aero Service.

Robert T. Sadler, member of the public relations staff, Lockheed.

Herbert Hildner, engineering vice president, North American Aviation, Los Angeles.

## G-E Instruments

# Help Keep the Aviation Industry Going Up!



General Electric offers a complete line of aircraft instruments to help solve the constant need and desire of the aviation industry for dependable instrumentation. "Skyvision" on the following pages will give you—in the shortest amount of your valuable time—a complete story of these typical General Electric instruments.

\*By Paul W. General Electric Company

GENERAL ELECTRIC

# G-E "Precision Plus" Instruments Serve Both Commercial and Military Aircraft



**IMPROVING MAGNETS** and magnetic circuits—the heart of electric instruments—are a part of many benefits incorporated into General Electric aircraft instruments from the seventy years experience of the G-E West Lynn, Mass. Measurement Laboratory. In designing and producing G-E aircraft instruments, all adaptable electric instrument improvements are utilized to provide product quality that more than meets the growing needs of our modern aviation industry. Three typical models are featured at the right to show—through "Slipvision" how G-E aircraft instruments are now serving throughout the whole aviation industry.

*use "Slipvision" below and see why...*

## ELECTRICAL QUANTITIES INDICATORS

G-E offers **baseline accuracy and versatility of application** in all aircraft instruments.

G-E electrical quantity indicators accurately measure current, voltage, power, or frequency in commercial and military aircraft. Instantaneous readings are given of values being used during such operations as road tests, loadings, or warming up periods. G-E offers a complete line of a-c and d-c dependable indicating instruments.



**Panel Voltmeter**

## ENGINE SPEED INDICATORS

**Rigid factory testing of G-E aircraft instruments ensures reliability.**

G-E engine speed indicators have "snap to read" scales which show jet or piston engine rpm on one, two, or four engine planes. Accuracy is indicated within a plus or minus 1% error at 15 degrees C, to 3000 rpm. This indicator can be connected in parallel operation without limitation of accuracy, and instruments are interchangeable.



**Percent RPM Indicator**

## POSITION INDICATORS

G-E instruments are **designed for long-range service, minimum of maintenance.**

G-E position indicators show position of landing gear, landing flaps, wing flaps or horizontal stabilizers. In some a few typical examples G-E aircraft instruments fulfill rigid military and commercial specifications and pass rapid environmental tests. Clear readability is assured with fluorescent luminous paint on all G-E dials.



**Three Diamond Indicator**

*Progress Is Our Most Important Product*

**GENERAL ELECTRIC**



## North Atlantic Operators to Test Airborne Teleprinter This Fall

By Philip J. Kline

Automatic teletype transmission of weather and other general aviation information to aircraft crews is slated for final evaluation this fall. The program is sponsored by Navtel, an informal organization of North Atlantic radio operators originally formed to angle remote radio telephone communications to North Atlantic flights.

Five airlines flying the North Atlantic agreed to give the equipment a test, during the annual meeting of International Air Transport Association's technical conference in San Juan last month. Subject to availability of equipment, Trans-Canada Air Lines, Trans World Airlines, Pan American World Airways, British Overseas Airways Corp. and Scandinavian Airlines System each plan to install an airborne teleprinter in at least one plane for the fall evaluation.

Several manufacturers have indicated their intention of having equipment ready by the end of the year.

In the addition of an airborne teleprinter, Navtel expects to relieve over-crowded audio telephone channels and to free the flight crew from maintaining long broadcast records to pick out the specific weather or advisory information of interest.

At the moment, Navtel is presenting the airborne teleprinter for its own operators. However, Via-Sat, the satellite-calling system developed by Pan American Airlines for its international operations, the airborne teleprinter system built for use on domestic aircraft.

### The Need

In the days when international carriers had radio equipment, they had capacity large volumes of information from which the flight crew abstracted material of interest to them, according to Hal Fenne, technical assistant to the director of telecommunications for Trans-Canada Air Lines. Navtel-based "weather telegrams" were sent to provide such service.

Today, such information is transmitted by voice communication directly to the flight crew, leaving them no means to search automated information banks and checking up on needed communication channels.

What is needed, Navtel believes, is a teletype broadcast service which would be received and printed out by an airborne receiver and teleprinter

The flight crew could then glance over the printed information, extracting what they need.

ICA's B. G. Donohue has completed a study of the problem which indicates that two moderate power ground stations, one on each side of the Atlantic, could provide the required service. One station is being set up at Finken, the other in the United Kingdom.

Characteristics of the ground system: 100-110 kw. band, with 40-mw. dc quiescent, 10-watt standard 5-watt standby, output at 60 words per minute.

### Specifications

Navtel has released the following general requirements for its ground-to-air teletype system:

- Weight: Both the airborne receiver and associated teleprinter must be light weight and reliable. Both should be designed for operation from 25 v. d.c. or 115 v. 400 cps single phase power.
- Coding: Airborne system should be designed to operate from standard FVX code now employed by ground stations for point-to-point teletype transmission. Ground-to-air teleprinter should have sufficient design flexibility

to accommodate more sophisticated coding if adopted at a later date.

• Reliability: Airborne receiver should be designed to ignore short duration high amplitude "spikes" of noise generated by local thunderstorms and precipitation, since Receiver should be designed to operate from a short "corrected" reference or omnibearing ground loop station.

Donohue has talked to manufacturers in the U.S. and Europe who might be interested in developing suitable equipment. He reported at San Juan that several indicated to have sets available by year's end. The final models now that fall will help to evaluate existing requirements and establish operating requirements. Until then, evolution is complete. Navtel system will make no claim for possible electronic installation.

American manufacturers interested in obtaining more information on the Navtel radio teleprinter broadcast program may contact B. G. Donohue, Telecommunications Dept., Trans-Canada Air Lines, Dorval, Quebec.

## New Speed Transducer Gives Rate of Climb

A vertical speed transducer with a very fast rate of response—time constant is 1 sec at 10,000 ft and 0.2 sec at sea level—is being produced by Trans-Sonics, Inc. The high-speed jet.

Standard rate of climb indication has a very slow rate of response at high altitude, according to Trans-Sonics, the time constant often exceeding 20 sec at 50,000 ft.

The transducer can be used to apply various other than rate of climb indications. Because of its high rate of response, the instrument's electrical output can generate a signal with self-excited lead to response rate. The transducer's jet output can generate a signal with self-excited lead to response rate. The transducer's jet output can generate a signal with self-excited lead to response rate.

The instrument also is a Trans-Sonics device called an "Elevator" to measure pressure differential between pressure in the plane's static line and a vent connected to the static line by a small capillary.

Difficulties in these pressure is proportional to vertical speed and the instrument is designed to provide an electrical signal proportional to the rate of ascent or descent of the airplane.

Address: Bedford Airport, Bedford, Mass.



Into jet training—also, low-speed handling

## Cessna T-37... Designed for Jet Training

Every time the T-37 returns from a test flight in Wichita, it is apparent that jet training is being made easier, safer. The reason: the new jet trainer has a slow handling speed, makes the move into jets relatively simple.

The shift from prop-driven to turbojet airplanes as a big step, imposes stiff requirements on the man who tries to fly with the

URAP. To meet these, the Air Force designated CESSNA responsible for building an aircraft which would readily fit into the pilot training program. Then, the T-37 is designed to do. Naturally, this means real savings in time and money.

\*\*\*

Here at CESSNA, we are proud to be a part of the Air Force's jet age planning.

CESSNA AIRCRAFT COMPANY



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Be an Avionics Cadet  
Inquire today at your Air Force  
Recruiting Office about the  
future you Air Force offers you.

**ONE INTEGRATED UNIT**—no associated amplifiers and compensators needed because of the small variation in transformer ratio and phase shift with varying input voltage

**EXCEPTIONAL ACCURACY:**  $\pm 2$  mil rail spacing,  $\pm 3$  mm maximum error, 0.05% rate amplitude error.

**COMPACT**—weighs only 5.87 oz

- 0.16V-400 CPS input voltage range. Special units may be designed for higher input voltages
- 744/79° input impedance
- Available with 1 and/or 2 input or output windings
- Transformation ratio (S/P) 953  $\pm$  0.15
- Phase shift:  $4^\circ/30^\circ/30^\circ$
- Max. static torque (oz in  $1/2$ ) 3

## SIZE 15 DESIGN-COMPENSATED precision resolver



Actual Size, Type 9D-2144

Write for complete information on Type 9D-2144 today. For your special applications, send detailed design requirements to help us to help you faster.

Other products include Actuators, AC Drive Motors, DC Motors for Special Applications, Motor Gear Trains, Servo Torque Units, Low Inertia Servo Motors, Synchro Differentials, Two Phase Reference Generators, Tachometer Generators and Motor Drive Blower and Fan Assemblies.

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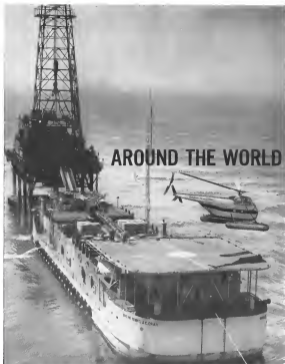
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**GULF COAST**—Specially designed float-type landing gear, pictured here, is now available for commercial Sikorsky S-55 helicopters regularly used to fly men and equipment between the mainland and off well drilling rigs offshore.

It weighs about the same as the wheel-type gear it replaces, which means S-55s can carry their normal large loads. These S-55s can land on water or beaches, on regular heliports, or on platforms at sea.



**SOUTH AMERICA**—Maps needed for civil development in South America will result from an Inter-American Geodetic Survey to be undertaken soon. Five U. S. Army Sikorsky H-19 helicopters will be used on the project. The big red and white Sikorsky will work in wet South American mountains. Double surveys in Alaska are planned.



**SWEDEN**—In Stockholm, air experts from Finland watch Ostermann Aero, Ltd., a pioneer commercial helicopter operator, demonstrate rescue techniques with a big Sikorsky S-55 helicopter. Ostermann plans to begin helicopter passenger service soon between Malmo, Sweden, and Copenhagen, Denmark.

## WITH SIKORSKY HELICOPTERS

### HELICOPTER HISTORY:



**Helicopter Gear Pioneered by Sikorsky's VS-300**

**EARLIEST USE** of helicopter gear on helicopter was on Sikorsky's historic VS-300, the first successful American helicopter. This picture made at Stratford, Connecticut on April 17, 1941, shows Igor Sikorsky at the controls of the VS-300. It had three rubber floats later version used two long floats, similar to those on today's S-55s.



**CALIFORNIA**—Los Angeles Airways' passenger service with Sikorsky S-55 helicopters now has been extended deeper into Southern California. A new route connects Santa Ana and Orange with Long Beach and the Los Angeles International Airport. Passenger service as far east as San Bernardino is planned by early summer, and to reach that a score of other cities around Los Angeles (see map) by the year's end.



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Another job done better  
with **Verson** presses

## Douglas Aircraft Cuts Forming Costs with this **Verson**-Wheelon Line-up



Specialized, operating data and clear  
instructions of operation jobs are given in the  
Verson-Allsteel Press Bulletin. Write for your  
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**VERSON ALLSTEEL PRESS CO.**

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At the Tenth of Fairley of the El Segundo Division of Douglas Aircraft Company, these Verson-Wheelon direct acting hydraulic presses are handling rubber pad forming jobs at a fraction of the cost of conventional methods. A 21,000 ton and two 18,000 ton presses are not only doing the job more economically, but are doing it better.

The Verson-Wheelon Press is lower in first cost than a conventional rubber pad press and is more efficient in operation. Installation and operation are simpler and for most jobs forming is completed in the press, eliminating hand finishing. If you do rubber pad forming or sheet metal forming it will pay you to investigate a Verson-Wheelon Press. For recommendations, send an outline of your requirements.

MACHINES AND HYDRAULIC PRESSES AND PRESS PARTS • STAMPING PRESSES • TENSILE • DIE CASTING • DIECASTING MACHINES

### LETTERS

and we would not be, having of plain metal  
ing with one or two approaches a size  
right reduced length.

► **Guides Fast Approaches**—to long in  
water is restricted to existing visible  
limits. Consider approaches lights with re-  
sulted the approach lights, one  
some discharge lights will serve for the  
golden path approaches.

Close long will there, been in industrial  
No form leads can be ported with the  
continue approach lights even by their  
most select approaches. It is often in going  
to progress and if all approach approaches is  
to be achieved something better is needed.

Ships, approach lights have been  
proved a weakness for the long going,  
not all of the approach approaches and  
limited approaches cannot power that fact.

11. **Case Plaster**  
6165, a Coast  
Hetherington, Ind

### Too Many Engineers?

As a reader of *AVIATION WEEK* and  
at present for the past 10 years, I  
also, with the title of William H. Wood  
(AV Week 2, p. 17) advise to the company  
change. My letter to you was prompted by  
your recent article "Suction Shoring"  
("Suction Shoring," AV Week 2, p. 11).  
In some respects this article is quite in-  
teresting and of the kind that is to be  
the best that Mr. Wood should do  
in his job, i.e. that the approach approaches  
in an engineering approach is at least  
in some respects.

► **Too Many Engineers**—I feel and still  
feel that the problem is not sufficient  
engineers but too MANY. This is not an  
idea which is to be considered. It is based  
on a certain truth and emphasized in the  
previous business for over 12 years.  
During that time, at least 1945, of an  
working time was wasted by poor decisions  
by an engineer.

The water always wanted in a report  
report report. Only 50% of the real  
work was done in the field. Of the re-  
maining 50%, was expended in the use of  
potential solutions, which reports found  
and lost.

Much of the engineering time is wasted  
on a lot of no-value reports that which  
good to have, actually have little to do with  
the production or design of reports. If  
the average engineer had as much  
paper work that way, actually superior in  
the job at hand, they would go bankrupt  
in private business.

The military are also at fault in this  
respect that they have yet to devise an  
outline plan to save common in design  
fighting planes other than an outline  
design time and material loss. Another  
angle is also that engineers in what is re-  
quired is also the continuing rate of  
working thousands of engineers in a  
small job.

► **They Were Expensive**—The water  
line, with its potential approaches  
found a design concept in many engineers  
own, with degrees and some without. They  
all left the aviation engineering field due  
to career risk in personal life, politics  
that are only a few large engineering office

## The HOSTESS CALL LIGHT SWITCH "GOES TO TOWN"



Frequently, where indicator lights  
must be used in conjunction with hostesses,  
modern aircraft design affects a work-  
able weight and panel space saving by  
using Hetherington switches with built-in lights.  
Developed originally by Hetherington on business  
lights, these compact little units are now available  
for a broad range of aircraft commercial or military  
aircraft services. Write for catalog.



**TYPE A100**  
Push-to-call, call-in  
switch with built-in  
light and indicator  
mechanism visible



**TYPE A101**  
Push light, call-in  
switch with built-in  
indicator light me-  
chanism



**TYPE A102**  
Push-to-call, call-in  
Type A1000 "push"  
switch with built-in  
light and indicator



**TYPE A103**  
Push-to-call, call-in  
switch with built-in  
indicator light me-  
chanism



**TYPE A104**  
Push light, call-in  
switch with built-in  
indicator light me-  
chanism



**TYPE A105**  
Push-to-call, call-in  
switch with built-in  
indicator light me-  
chanism

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FOR BUSINESS AND AIRCRAFT (MILITARY)  
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**HETHERINGTON, INC., Sharon Hill, Pa.**  
(Wire Control Division 2145 W. Whittaker Blvd., Tulsa City, Okla.)





C-130A Medium Combat Transport

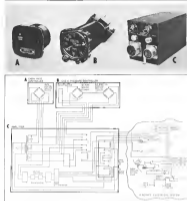
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DRAWINGS CHECKERS • SERVICE MANUALS • MATHEMATICS

Write in complete confidence to LOCKHEED AIRCRAFT CORPORATION, DEPT. ATE-4-18, 761½ Peachtree St., N. E., Atlanta, Georgia.



**CABIN PRESSURE CONTROL SYSTEM.** As used in Douglas DC-7C, amplifier will be slightly different than shown here; light bulbs will be mounted only during test of equipment.

## Kollsman Reveals Developments In New Instruments, Controls

By George L. Christian

Airline instruments should be built not to solve needs.

First considerations should be concerned and presented visually in a form that is easy to grasp and not subject to misinterpretation.

These two philosophies are guiding much of the work now being done by Kollsman Instrument Corp., Elizabeth, N. Y.

First example of the airline client is an all-electric cabin pressure control system which will be standard equipment on the Douglas DC-7C. Components are standard; pressure Kollsman good with which are well-established through wide use in other applications.

The brand new visual instrument presentation is becoming increasingly important for today's experienced pilots

They must have clearly intelligible instruments in front of them which can be read at a glance.

Example of this trend is the Kollsman constant altimeter (AW Apr. 25, p. 72) which uses a two-digit counter indicator to show altitudes in the thousand and ten thousand foot range.

A single needle indicator ten and four.



**PHOTOELECTRIC** constant altitude indicator.

drift fast altitudes in 10 ft increments. Company officials feel that this presentation can be read much faster than the three-pointer type widely used today.

Another instrument still under development and aimed at turboprop and turboprop powered aircraft is a computer which will combine and present the pilot data which requires no further calculation.

### Cabin Pressure Control

Here are first details of the new, all-electric cabin pressure control system which Kollsman engineers say will be used on the Douglas Seven Sea and is also replacing current piston control systems in some DC-6s.

Here is a basically simple, rugged, diaphragm-operated pressure indicator of which Kollsman has manufactured thousands for many years. So the airline will benefit from the company's long-accumulated experience with the unit.

At the center is all-electric and diaphragm-operated, no cables are flown through the sensing mechanism. This large concentrated instrument from being departed on the system's working parts and improving their operation, as happens in more complex systems.

Three pressure indicators sense the airplane's altitude, cabin rate of climb and differential pressure between cabin and aircraft.

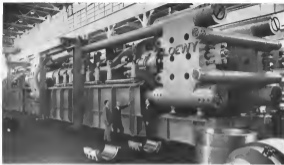
Electrical output of the first two pressure indicators is fed into an amplifier (pre-amplifier or transducer), where their respective phasing is determined, amplified and fed to a cabin pressure control valve. Signals from the third differential pressure indicator are also sent to the amplifier. Its output is strong enough to operate altitude monitoring signals, allowing it to position the cabin pressure control valve to prevent cabin pressure from exceeding a predetermined value.

System operates in a single. A cabin pressure controller which resembles a standard altimeter, is mounted in the cockpit accessible to a crew member. Dual a calibrated in feet of pressure altitude from zero to 40,000 ft. There are two unimposed positions, one for flight altitude, the other for cabin altitude.

On the instrument are two manual limiters, one to increase altitude desired, other to cabin rate. All other operation is automatic.

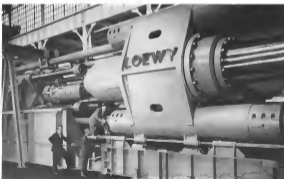
Cabin rate is usually held at 500 feet per minute or less. Kollsman spokesman says the system's degree of control accuracy is something new to

# FIRST KAISER ALUMINUM



Photographs (above and below) of one of the two new 8,000-ton presses built by Loewy. Each press has two main cylinders with a total of 8,000 tons and 1 pressure cylinder of 3,750 tons. Maximum

output per hour will be 30" O.D. x 36" long. Maximum coils are will be 17" in diameter. Maximum weight per piece will be 1,200 lbs. Maximum blank length will be 63 feet.



# 8,000 TON PRESS

## starts production of extrusions in September!

Second 8,000-ton heavy extrusion press soon to be operating at Kaiser Aluminum's Halethorpe, Maryland plant

The first of Kaiser Aluminum's two 8,000-ton heavy extrusion presses at Halethorpe will start operation in September—producing longer and wider extrusions up to 17" in cross section.

These new heavy extrusion presses—built in cooperation with the Air Force Heavy Press Program—are an important addition to Kaiser Aluminum's existing extrusion facilities.

The new Halethorpe heavy extrusion plant is completely equipped and fully integrated for the production of heavy extrusions exclusively. It contains the most modern heat-treating and finishing equipment, die shop and laboratory.

Included are both vertical and horizontal heat treating furnaces, a 1,500,000-pound stretchers, modern heading equipment for large extrusions, and shipping and inspection facilities.

In addition, the plant contains a modern remodeling and

coating department, homogenization furnaces, aging and annealing areas, and induction billet heaters.

The second of the two giant presses will insure air frame manufacturers against delays and disrupted schedules due to temporary equipment shutdowns.

### Major advantages to aircraft and other industries

The large extrusions to be produced by Kaiser Aluminum's two 8,000-ton presses offer potentially huge savings in both money and man-hours in the aircraft, transportation, electrical and other industries.

The use of these large extrusions will, in many applications, eliminate the costly production and assembly of smaller component parts.

Company engineers should prepare designs promptly in order to overcome the required lead-time and benefit from the press' early operation.

Kaiser Aluminum engineers with long experience in extrusions are eager to work with you on your design. If you would like to see how heavy aluminum extrusions fit into your production, you are urged to take immediate advantage of this service. Contact Kaiser Aluminum & Chemical Sales, Inc. General Sales Office, Palmolive Bldg., Chicago 11, Illinois. Executive Office, Kaiser Bldg., Oakland 12, California.

## Kaiser Aluminum

setting the pace—in growth, quality and service



Aerial view of the new Kaiser Aluminum plant which will house the two 8,000-ton heavy extrusion presses. Plant is located adjacent to existing Kaiser Aluminum facilities at Halethorpe, Maryland.

**First** in performance  
for automatic muscle jobs  
like these...

**T-J**

## Spacemaker CYLINDERS

**OFF SHELF DELIVERY**

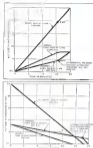
- Oil pressure to 750—Air to 300 P.S.I.
- New Compact Design... Serves up to 4055 Space
- Proven Performance... with Extra High Safety Factor
- Super Cushion Flexible Seals for Air... New Self-Aligning Adjustable Oil Cushion
- Weld Chrome Plated Bodies and Piston Rods
- The Only Cylinders with all the Select as Standard

T-J Spacemaker Cylinders get first call for an unenvied range of power movement jobs in industry today—because they're so advanced in design... so efficient and dependable in performance. Wide selection of styles and capacities. Check your needs, send for bulletin, \$5M-654-2. The Tomkins-Johnson Co., Jackson, Mich.

Ball	Open
Lock	Thru
Knob	Blank
Press	Knob
Spin	Blank
Turn	Blank
Offset	Sequence
Reset	Close
Weld	Lock
Sealless	Press
Band	Blank
Cable	Feed
Draw	Mill
Knob	Blank
Blank	etc.

Member of the 10-Point PMA Power Association

**TOMKINS-JOHNSON**  
Circle 40 on Reader Service Card



GRAPHS show effect of shock and duration on valve pressure control valves

the valves. They claim the system controls control pressure change with an accuracy beyond the capacity of a human being to sense. Excessive leaks or regular air-line flirts show that passages usually direct full pressure change within the color during shock or between. Koffman says.

A cushion feature designed into the valve insures that at loading the color pressure will always decrease as normally at a comfortable rate to correspond to field conditions.

### Pressure Monitor

Here is a general description of how a differential pressure monitor works.

A fitting leads one of the two passages to be measured to the inside of the monitor's diaphragm. Another fitting allows the second pressure to enter the instrument's case where it acts on the outside of the diaphragm. (On an absolute pressure monitor, an aneroid diaphragm is used and ambient pressure acts on the outside of the diaphragm only.)

Expansion or contraction of the diaphragm is transmitted to a rotating shaft through a link and collimating arm.

The link is attached to a tripless case compensator mounted on the diaphragm's overpressure. Any diaphragm movement through the rotating shaft, in one direction or the other, on frictionless spring points.

Amount of rotating shaft motion is adjustable by moving the collimating arm in or out of the shaft.

A C shaped iron armature is attached

## Electronic Favorites in the GAGE LABORATORY



These Sheffield electronic instruments are ideal for:

1. Highly accurate measuring on surface plates
2. Checking masters and working gages
3. Setting snap and length gages
4. Checking precision tools and blocks

The particular electronic circuit in these instruments is exceptionally stable. Protection from disturbing low voltage fluctuations eliminates drift, prolongs vacuum tube life and permits continuous use without the inconvenience of readjusting.

The measuring meters respond instantly but without overshooting, for quick, accurate readings. Remote gauge head location precludes any harmful effects due to vacuum tube vibration. Read Gage and Instrument Division, The Sheffield Corporation, Dayton 1, Ohio, U.S.A.

**ELECTRONIC No. 4 INTERNALS** Check of the world's finest laboratories. Amplification, 1000/3000 Dual, 3000/10,000 Dual, 5000 Single, work performance, .0001 to 12.000", gaging depth, 1 1/2"

**ELECTRONIC HEIGHT GAGE** First choice of the best laboratories. Amplification 1000/3000 Dual, scale range, .001", checked production, .0001", overall vertical range, 24"



**NEW HORIZONTAL EXTERNALS** Dual amplification, 1000/3000 in use, capacity 12", vertical scale travel 24", microscope in track with 1" adjustment



**NEW ELECTRONIC COMPARATOR** Dual amplification, 1000/3000 and 5000/10,000 in use, scale ranges, .001", .0015", .0004" and .0003", vertical capacity, 4" and 11 1/2" x 5"

**UNMATCHED ELECTRONIC READ-OUT** Dual amplification, 1000/3000 in use, scale range, .0015", super precision microscope, work capacity 24" for length and 10" for diameter

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MANUFACTURE AND REFINEMENT FOR MAKING

WRITE FOR SPECIFIC  
ENGINEERING DATA SHEETS  
ON ANY OR ALL  
OF THESE INSTRUMENTS

1310







## POWER STEERING

*provides  
faster, safer  
maneuverability*

Load and Diesel are pioneers in the design and development of power steering. With the design of jet aircraft, it was necessary to improve the pilot with controls that would insure faster and safer ground maneuverability.

Load was the originator of the first package assembly including power steering cylinder, steering control valve, steering damper, damping orifices, and thermal temperature compensators all in one unit assembly. Load was the first large volume producer of this rotary output assembly steering unit, and has now become one of the largest producers of power steering for aircraft in the country.

"Proving Time... Tomorrow's Aircraft Requirements" has resulted in using "First". As an example is the design and development of electrical control for power steering, to replace all mechanical connections between pilot and control wheel. Now the pilot has direct control that was never obtained, with considerable savings in weight and axial cost, as well as installation and checkout time in the airplane.



"PRODUCING TODAY... TOMORROW'S AIRCRAFT REQUIREMENTS"

**H. W. LOUD MACHINE WORKS, INC.**

DEPT. 11

969 EAST SECOND STREET • POMONA, CALIFORNIA

## Turbine Lube Pump Has Two Elements

Available for jet engine turbine lubricating are MBL-0-0001 and MBL-0-0002 over a temperature range of -80 to 300°. Model MBL-0-0002 pump has two elements—one designed with relief valve for pressure lubrication of engine bearings and the other to scavenge the bearing sump.

Each element has a displacement of 0.256 cu in. per revolution and a rated capacity of 1.3 gpm. maximum at 0.5 in. Hg inlet vacuum, 90 psi discharge and 3,300 rpm. Relief valve is externally adjustable and is normally set at 70 psi operating pressure. Weight, 2.75 lb.

Loan, Inc., Loan-Romero Division, Elms, Ohio

## Low-speed Motor for Synchronous Uses

A new line of synchronous motor units has applications requiring moderately high torque at low speeds, synchronous speed operation, or small displacement in mounting. Typical applications of these Type SMT motor units include recording devices, control and feed motion, and precisely controlled motion and servomotors.

Units are available in torque ratings of 75 and 200 in.-lb. at 60, 50 and 25 cycles.

General Electric Co., Specialty Can plant Motor Dept., Schenectady, N.Y.



## C-133 Gets Big Cooler

Hege Douglas C-133 turbojet powerplant transport will be air conditioned by the big 280 ft. Allison turbofan air unit, which has constant speed with 14 ft. turbine compressor and 14 ft. fan on Douglas A1D Skylark engine. Allison C-133 will cool only one three standard size burner, Allison says.

## From Wyandotte... answers to modification & maintenance problems



At Wyandotte's modern research center (above), performance-proven products are developed and tested. Frequently new chemical products are developed and tested. In addition to large plants at Wyandotte, Mich.—Wyandotte's vast facilities for producing specialized chemical products include a new plant in Los Angeles, California.

YOUR PROBLEM	ANSWER	DESCRIPTION
1. Brown cleaning	Alkox	Oil soluble formulas remove all types of oil from aircraft systems, tanks, engines
2. Sparkies cleaning	50004	Removes USAF Specification 2001-5 and All-Cl-123 (and) All-Cl-124 (and) All-Cl-125 (and) All-Cl-126 (and) All-Cl-127 (and) All-Cl-128 (and) All-Cl-129 (and) All-Cl-130 (and) All-Cl-131 (and) All-Cl-132 (and) All-Cl-133 (and) All-Cl-134 (and) All-Cl-135 (and) All-Cl-136 (and) All-Cl-137 (and) All-Cl-138 (and) All-Cl-139 (and) All-Cl-140 (and) All-Cl-141 (and) All-Cl-142 (and) All-Cl-143 (and) All-Cl-144 (and) All-Cl-145 (and) All-Cl-146 (and) All-Cl-147 (and) All-Cl-148 (and) All-Cl-149 (and) All-Cl-150 (and) All-Cl-151 (and) All-Cl-152 (and) All-Cl-153 (and) All-Cl-154 (and) All-Cl-155 (and) All-Cl-156 (and) All-Cl-157 (and) All-Cl-158 (and) All-Cl-159 (and) All-Cl-160 (and) All-Cl-161 (and) All-Cl-162 (and) All-Cl-163 (and) All-Cl-164 (and) All-Cl-165 (and) All-Cl-166 (and) All-Cl-167 (and) All-Cl-168 (and) All-Cl-169 (and) All-Cl-170 (and) All-Cl-171 (and) All-Cl-172 (and) All-Cl-173 (and) All-Cl-174 (and) All-Cl-175 (and) All-Cl-176 (and) All-Cl-177 (and) 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## DOES THIS BUSINESS FLYER KNOW ABOUT YOU?

Altimeter Specimen: Could he find your altimeter?

Barometer: Could he find your place of barometer?

Weathermeter? Does he know where to buy the products you sell?

This man is important to you. He is one of an ever growing number of men who are flying. They are flying for over 400,000 hours every year. He needs to know about you, your products, your service, your altimeters, barometers, weathermeters, and your altimeter. He needs to know about you, your products, your service, your altimeters, barometers, weathermeters, and your altimeter. He needs to know about you, your products, your service, your altimeters, barometers, weathermeters, and your altimeter.

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Altimeter, Barometer, Weathermeter, and your altimeter.

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Altimeter, Barometer, Weathermeter, and your altimeter.

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Altimeter, Barometer, Weathermeter, and your altimeter.



1929



1933



1934



1941



1954



1955

KOLLMAN DISPLAY of vital cockpit data that tells pilot how high he is flying.

## Altimeter History: 26 Years

1929 June 18. Desirable and this Kolman altimeter, altimeter is the lowest blood flying experiment. Limit on the one was 20,000 ft. display was two pointers—one for hundreds the other for thousands of feet.

1935. The third pointer came in about now on the altimeter altimeter with a range to 35,000 ft. Large pointer could

hundreds, small pointer could thousands. On a separate dial, a tiny pointer marks the ten thousands level.



## Aircraft Controls

... high speed remote positioning systems for rapid, accurate response

Offering a unique wheezy feedback action, this Barber-Colman high speed positioning system is designed for remote control of aircraft throttles, jet afterburner valves, fuel cell apparatus, and various other aircraft applications. Rapid, accurate response at high velocities is obtained without hunting ... at speeds up to 50" per second (15 rpm) or one inch per second (linear). This Barber-Colman 26-inch d.c. system consists of either a linear or rotary actuator with integral potentiometer, a transmitting potentiometer, and a feedback control unit. A Barber-Colman Motorpotentiometer, also sensitive potentiometer, provides a simplified non-electronic method of control. On the new remote positioning problem, arrange this accurate, high speed system. It can very likely be your answer.



TRANSMITTING POTENTIOMETER



LINEAR ACTUATOR (Basic type also available)



CONTROL BOX

### OTHER BARBER-COLMAN AIRCRAFT PRODUCTS



**Transistor Control**  
Control full powered, miniature electronic ... for a variety, convenient and accurate altimeter.



**Valves**  
Wide variety of altimeters and potentiometers for use in altimeters for altimeters and altimeters.



**Actuators**  
Remote and linear types controlling gear, switches, switches, switches, and other functions to meet most applications in their field control area.



**D.C. Motors**  
Permanent magnet and split pole types up to 115 ft. Also gear heads, direct, lock gears.



**Wheeler-DeWitt Motors**  
A complete line of motor and potentiometer for use in altimeters for altimeters and altimeters.



**Wheeler-DeWitt Motors**  
Permanent magnet is available from 50 to 115 ft. Also gear heads, direct, lock gears.

In addition to the High Speed Remote Positioning System described above, Barber-Colman also provides a Basic Remote Positioning System for constant speed control applications and a Mechanical Control Servo System for simplified positioning control of actuators. Used for mechanical altimeters. Whenever you have need for remote positioning controls, contact Barber-Colman engineers for the system best suited to your application. Engineering sales offices in Los Angeles, Seattle, Indianapolis, New York, Montreal.

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motor drive

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the white indicator with the roll reference.

1948: One dial, three pointers, and a range of 50,000 ft characterize this Army model altimeter. This was one of the standard instruments that lived through World War II to enhance post-war cockpit instrumentation layouts.

1954: Still one dial, and three pointers but a shaded area for easy reference has been added. When it is closed, the altitude is about 17,000 ft. The 10,000 pointer is extended out of the cover at the other hands.

1955: One pointer, one counter on this sensitive altimeter. The counter reads thousands, the pointer indicates thousands, in this design aimed at improved readability of altitude. This could be the last of the "clocks."

New instruments experts favor the electronic or video-type presentation of altitude information, somewhat like the Hughes proposal (AVF Apr. 25, p. 31). In such schemes, a visual comparison of altitude is directly given without any need to read numbers. The indicator is a plane altimeter superimposed on a vertical graduated scale with a format electronic line or shaded area at the bottom. A digit pointer records the actual altitude of the aircraft at all times.



#### Lockheed Tortures Landing Gear

Development of lighter, stronger aircraft landing gear is the purpose of this 40-ft. long test tower at Lockheed Aircraft Corp.'s research center, Burbank, Calif. It allows close gear load and displacement measuring devices made by Binks to Line-Hausler Corp., Philadelphia, determine motion of the gear while it is being run. The device applied to it during simulated landing. A Control-Rite's main gear is shown rigid for lifting. Heavy weights on platform above the landing gear aid in simulating actual gear's weight.



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GE 3-5411			DL 3-7140
<p>LOWEST COST HANGARS OBTAINABLE. QUALITY STRUCTURAL-STEEL HANGARS • OVER 150 HANGARS BUILT THROUGHOUT THE WORLD. 30000 SQUARE FEET TO 200 FEET • HEIGHTS TO 60 FEET • SINGLE AND DOUBLE HANGARS. HANGAR PARTS. NEW HANGAR DESIGNS. BUILT ON PAVED (POT) • GOLF AND RACE TRACKS.</p>			

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*Test Made with Equipment  
Exposed to Full Range of  
Weather Conditions.*



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*—Send for Technical Data Sheets*

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(Continued from p. 65)

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**HYATT**  
ROLLER BEARINGS

## Ford Speeds J57 Disk Machining

Compressor disks for the Ford-built, Pratt & Whitney J57 turboprop were once machined on both sides simultaneously in a convoluted lathe that used to make out piston-rod and crankshafts.

The development is credited to Ford Aircraft Engine division's mass production department, a group organized to supply convoluted round parts when vendors in manufacturing fell behind schedule.

More difficult with the J57 disks is because of their thin sections, is not only 1/8 in. thick. To machine this thickness used to be a problem. The disk tended to disk if too much tool pressure is applied, processing time is high because of the number of times each disk must be turned during finish machining, and scrap losses have proved to be very high.

Solution to the problem—which belittled Pratt & Whitney and Thompson Products, as well as a Ford—was found in the conversion of its exclusive Weldon Center Drive lathe. Tool designers extracted one just for compression, instead, the job was done in about five minutes in semi-production.

Results: Set up time has been decreased 75%, output of the disks has doubled, quality has been improved and scrap losses are negligible.

## Boeing Checks Metal

To help predict fuselage characteristics at cruise, the true stress strain recorder has been developed by Boeing Airplane Co. As a metal sample is pulled at both ends, the machine constantly measures the changing cross-section.

These measurements are plotted with other factors to give a true stress strain curve. Boeing says that conventional stress-strain random plot effects of load against only the material's original cross section.

## Central Mail Pay Set

A fuel mail rate has been set for Central Airlines by the Civil Aeronautics Board for the first time since the carrier started operations.

CAB has ordered Central to show cause why it should not be paid \$7,721,466 for the period between start of operations, Sept. 15, 1949, and Dec. 31, 1954. This includes a break-even total of \$7,526,249 and an earnings element of \$195,497.

The proposed mail pay is approximately \$496,000 more than the local service carrier has received during the period involved under its temporary payment rate.

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## NEW AVIATION PRODUCTS



### SeaMaster Gels Turbine Starter

Dead prop: GTCSP 35 psi turbine auxiliary powerplant fitted to new Martin XP5M-1 SeaMaster jet powered buoy boat delivers compressed air to start the engines and simultaneously generates electrical power.

Small turbo powerplant makes the SeaMaster completely independent of outside power sources, the author says, permitting it to operate from isolated bases.

Aerotech Division, Garrett Corp., Los Angeles, Calif.



### ADF Designed to Arise Speed

Combination radio compass and range and communication receiver has dual 90-1,710-kc frequency range, remote control tuning, sliding two decade switches for channel selection at 100 and 10-kc intervals. Coupled with a variable fine tuning subelement having a 10-kc spread, the model promotes convenience during throughout the specified frequency range, the maker reports. Model ADF-100 system is said to be equivalent to Aerotech's ADF-1000 from requirements.

System's remote control unit is an inexpensive Skytronic in weight is under 3 lb. Receiver and main deck mount is about 35 lb. Normal operation can be handled under ambient temperature variation of -55 to 70C.

torque changes from 10%-91% at 50C and at altitudes to 30,000 ft with out concentration.

Leve, Inc., LosCal Division, 3271 S. Buena Vista, Santa Monica, Calif.

### Moment Lift is Field Installed

Moment lift, providing improved driver velocity and spreading multistage handling, has been designed for field installation on Hyster UC-30 and UC-40 1,000 and 4,000-lb lift trucks, the maker reports. The unit will be retrofitted automatically in July.

Moment unit is said to afford a 15% increase in lift speed compared with previous installations. Rated speed is 35 ft/min, the maker reports.

Three type cylinders for self-discharging pushing gland to measure of leakage and extend pushing life.

Hyster Co., 2902 N. E. Chicago, Portland 5, Ore.



### Float Valve for Integral Tanks

Float mounting drive valve for air craft integral fuel tanks is supplied in versions that are non-leaking or locking in the open position.

Model 9107 is designed to operate in ambient of -40F to 160F. Proof pressure is 50 psi and weight is 0.07 lb. Basic valve body may be modified to accommodate any thickness wing skin.

Allen Aircraft Products, Inc., Kansas, Ohio.

### Transformer Weighs 9.604 Lb.

Model Transformer transformer assembly, Model 100W-32, has a primary resistance of 20,000 ohms, secondary 1,000 ohms, d.c. primary resistance of 2,014 ohms, secondary, 347 ohms. Power rating for primary inputs from 1 to 7.5 at 2.5 sec.

The General-Hallmark Transformer Corp., 2734 N. Paulina Rd., Chicago 39, Ill.



### International Plane Coupling

Cast aluminum couplings in 3, 5 and 8-in. sizes, made to American, British and Canadian (MCC) standards for aircraft air conditioning lines, will handle inter-connection of the three national air forces, the maker says. These lines are used to trail aircraft from takeoff.

The 3-in. coupling has special hose clamp with handles to permit easier handling. A step-down coupling is also available to permit use of as little as 3-in. conditioning line when only a 5-in. outlet is available on the plane.

Wiggins Oil Tool Co., Inc., Los Angeles 33, Calif.



### Tester for Aluminum Anodizing

New instrument tests efficiency and sulphuric acid type anodic coatings on aluminum in seconds, according to the manufacturer. The device operates on the principle that the 10-sec. "break" down voltage is proportional to the coating type and thickness; the thicker the coating the higher the breakdown voltage.

Equipment has three voltage ranges: 0.20, 0.100 and 0.050 v. The lowest range handles electronic and logic coatings, the upper ranges sulphuric acid. Tester is cost-limited to \$5 and



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Downs B-47 Strikewoman (left) refueled by KC-97 tanker equipped with Trent developed "Flying Boom" system of refueling.

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to protect the worker from electrical shock. Unit weighs 5 lb.  
Sears-Roebuck Scientific Instrument, 8810  
Grant Ave., Philadelphia 15, Pa.



### 2-Platform Lift Truck

Two independently operating platforms which can be separated as much as 62 in. are featured in this hydraulic electric lift truck with a 4,000 lb. load capacity.

Upper platform measures 69 3/4 in., lower is 58 1/2 in. Overall truck

height is 60 in.  
Yale & Towne Manufacturing Co.,  
Yale Materials Handling Division,  
Philadelphia, Pa.



### Computer Speeds Machining

Machining problems can be solved in minutes using a new electronic computer that can consider operational variables such as machine grade, speed, feed, depth of cut, tool life, alloy steel tool hardness and the like.

Costing \$500, the 12 lb. computer measures 13 1/2 x 10 in. It will become available this September. Each computer will be registered so that the owner can keep records as to which tool life measurements data is available.

The unit was developed by Dr. W. W. Gilbert, formerly of the University of Michigan and now with General Electric Co.'s Manufacturing Services Division, Schenectady, N. Y.

General Electric Co., Carbide Dept.,  
Detroit, Mich.

### Motor for Miniature Byron

Electronic drive Type GAA motor for direct mounted hermetic pump, applicable to flow control or guidance systems, features open slot construction providing high torque. It is useful in starting an low temperature without heater, the motor runs. Maintenance free life of 1,000 hr. a guarantee.

Motor is rated at 100,000 psi-in.<sup>2</sup> volume/sec at 11,000 rpm and is de-

light is 60 in.  
Yale & Towne Manufacturing Co.,  
Yale Materials Handling Division,  
Philadelphia, Pa.

### Motor for Miniature Byron

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Westinghouse Electric Corp., Aircraft Dept., Lima, Ohio

### ALSO ON THE MARKET

Tapco-highspeed steel tool bits are added to carbon steel shafts maintains avg. high Rockwell "C" 65-68. Teeth are surface ground to plus 0.000 in. and meet 0.004 in.—New Tool Co., Inc., Columbus City, Ind.

Archimede pellets for plating baths tends to keep the chrome used in the solution, preventing escape of fumes, gases and droplets—Sawtooth, Inc., Cleveland, Ohio

Right-angle drilling on any standard drill press can be handled using self contained unit that looks quickly with a cam wedge—Machpro Drill Head Co., P.O. Box 4645, Detroit 32, Mich.

C-490 automatic drill riveter has a thrust dupli of 24 in., thrust height of 17 in., Capacity is 70 rivets per min rate—Power Machine Company, Inc., 705 Elford Ave., Buffalo 7, N. Y.

Kapco an automatic machine dog works on 75 100 lb. line programs. At the latest it costs a hold-over pressure of 450 lb. it is stated. Cheap set up by tightening into position using standard 4-in. bolts—Burlin Co., 1420 Glenview Blvd., Los Angeles, Calif.

Direct-reading electronic tachometer uses a timing disk as a reference and is stated to measure up to 9-60-000 rpm range with a uniform accuracy of 0.2%. An instrument calibration curve generally accuracy of 0.5%—Scientific Instrument, 1810 Grant Ave., Philadelphia 17, Pa.

Aircraft fuel has an adjustable torque control and non-splashing adjustment, the latter feature enabling blind-hole tapping. Iron size standard Jacobs tapping checks or both down tap drivers—Keller Tool Division, Gardner-Wharfed Corp. Herts, Mich.

Height gauge range for 18-in. to 24-in. units applies scriber or indicator for measuring without physical contact. Combination microscope/tachograph provides exact usage throughout reading

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detectors of 2½ in. through industry with 30X magnification, closeup and 1X for distant work.—Quanta Control Co. 1566 N. Western Ave., Los Angeles, Calif.

Hi-Vap 5401 portable electric solder for light gauges has precision fusion gauge welding accuracy, from one-tenth to one second. Accuracies will exceed throat depth from standard five to 15 in.—Bettler Corp., 15 N. Adelaide St., Chicago 7, Ill.

Crown Febs, a triangular-shaped, ceramic, hand tooling machine for the heating and finishing, is stated to have service life several times longer than natural stone or aluminum made-type tumbling chips.—Crown Abrasives & Supplies Co., 3405 Koshoff Ave., Chicago 18, Ill.

Flow control system on all Fowrey submersible will show if tool is overused, stopping action before damage occurs.—Fowrey Machine Co., 263 N. 2nd St., Philadelphia 19.

Lo-Z-Twist wire twisting tool will open up take wires from 0.075 to 15 gage. Either left or right-hand twist is possible.—All-Purpose Tool Co., 2046 Union Ave., Brooklyn 14, N. Y.

Type LNH/H video isolator for carbon measuring can handle of over 17,000 lb. each, the maker reports.—Kathard Co., Inc., Long Island City, N. Y.

Target stud driver for pressure, capact and drives the stud in push direction pressure instead of conventional pressure stud the stud.—Titan Tool Co., Mass St., Foreman (Erie County), Pa.

LTX power bench type pump press can work at 250 operations per minute, using 4 hp. motor.—Allen Allen Industries, Fluids Pumps Dept., 1000-1105 N. Third St., Chicago, Mo.

High-frequency electric impact wrenches are made in two models: HP24R with a reversing bottom in the handle. Model HP25, which is non-reversible.—Titan Power Tool Co., Ames, Ill.

Lead knitting and knitting PolyNet works within an accuracy of 1/100 in., the maker states, independent of the crane or hand control system. Instrument also acts as a crane scale.—Machon Sales & Service Corp., Glendale, Calif.

Recofilm makes white copies of trace laser printed material in plastic in 12 in. wide using dry developer.—Recofilm Co., Redding Ridge, N. J.

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Performing light cigarette drill press on table standard heavy duty 1, 4 and 10-in. bit capacities. Unit remains locked in place after cancel is depressed—Lapour's Tool & Die Co. 12681 Northwestern Highway, Farmington 4, Mich.

**Armored Jet stainless steel hose clamp** is attached by pushing housing to ring fit on clamp band, worn screw thread then automatically drops into slots. For quick detach, worn screw is lifted and end springs open—Russo Corp., Inc., Union, N. J.

Slotted angle 225-88 framing material - "do it yourself" item for fabricating shoring, racks, conveyor supports, bins, ladders, scaffolding and the like. Assembled with bolts - Acme Steel Co. Chicago, Ill.

Dynamic 100 drill unit has swivel head and adjustable hydraulic feed control permitting rapid traverse to work and return. With automatic control bar and cycle timer, the unit can stop and park drill. —Berlinc Co., 5425 Glen Dale Blvd., Los Angeles 18, Calif.

Silicone rubber Class T00 remains flexible at 600°F for at least 150 hr. and is suitable for molding extrusion or calendering.—Silicone Products Dept., General Electric Co., Westford, N. Y.

Then-strap four-high rolling mill handles ferrous and non-ferrous material to 3 1/2" wide at speeds to 500 fpm. Mill will roll down to less than 0.001-in. finish; rag edge at total thickness tolerance of 1%—Strait Manufacturing Co., Inc., Long Island City, N. Y.

Reasonable VCI-lined cushioned bags for shipping metal and electronic parts will prevent rust and corrosion for up to 10 yr., the maker reports. Bags are available without corrosion inhibitor liner. Jet-Pak, Inc., 899 Summer Ave., Newark, N. J.

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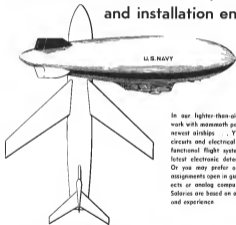
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## Thanks for Taming a Wild Horse

This is a message of appreciation to American industry. The occasion for the message is the completion of our eighth annual McGraw-Hill Survey of Business' Plans for New Plants and Equipment.

To a considerable degree, our appreciation is personal. It goes to the companies whose cooperation made our survey possible. Twice as many companies as in any previous McGraw-Hill annual survey carefully answered our questions about their plans to invest in new producing facilities. They gave a great deal of expensive time to the job. The cooperation of these companies, which employ nearly eight million workers, put the results of our survey on the firmest footing, in terms of coverage, it has ever had. For this cooperation we are most grateful.

But our appreciation is much more than personal. It extends in even greater degree to the kind of planning of investment in new plants and equipment which our survey revealed. The nature of this plan-

ning holds out promise that American industry is on the way toward bringing under control what historically has been one of the most upsetting forces in the American economy—the violent fluctuations in business capital investment. Progress in taming out these fluctuations gives occasion for public gratitude.

### Very Good Business News

The part of our survey that attracts the widest attention is the news they give about immediate business prospects. And this year the news is very good. The survey results indicate that American business as a whole plans to invest \$29.5 billion in new plants and equipment this year. That is 5% more than was invested last year, and a new high for any year.

Plans for the years 1956-1958 are also remarkably encouraging in terms of the amount of investment is projected. American business reports that it is already planning to spend within 3% as much for new plants and equipment in 1956 as in 1955. In the past, the expenditures planned for future years have always been sharply lower than those planned for the current year. This is understandable enough. It is sometimes impossible to anticipate all the expenditures that will be necessary a year or more hence. Then the fact that plans are already made

A full report of the results of the eighth annual McGraw-Hill Survey of Business' Plans for New Plants and Equipment will be sent to anyone requesting it from the Department of Economics, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 36, N. Y.

to spend almost as much in 1956 as this year is very good news about business prospects. The level of investment now planned for the years 1957 and 1958 is also remarkably high—far higher than ever reported for years that far ahead in previous McGraw-Hill surveys.

### Taking the Long View

The fact that these plans exist is of insurance-construction significance. It clearly indicates that more and more, and now in dramatic degree, American business is taking the long view in making its plans for capital investment. It is developing a program which, if successfully carried out, will go far toward eliminating the haphazard, destructive saving and spending of what is in effect the central power house of our economic system—capital investment by business. Upon the level of this investment depends not only the general state of our prosperity but our progress in raising the American standard of living with new products and new and better industrial processes.

Seven years ago, when we first asked industry to estimate its capital spending beyond the current year, only a small minority of companies could give us any estimates at all. This year, 87% of the cooperating companies—and it was a far larger number of companies—could comply with our request for estimates for the years 1956-1958.

### It Pays to Bet on Growth

A number of developments help explain the increase in long-range planning of capital investment. One is the increasing technical complexity of American industry. It often takes longer, in this complicated age, to work out a successful installation of new plants and equipment. Another reason for long-range planning is American business management's increasing conviction that it pays to bet on the demonstrated capacity of the American economy to grow over the long pull. With this goes a corresponding determination not to let short-term business fluctuations upset individual company

plans for growth through addition of new plants and equipment. An additional factor, and one of great and increasing importance, is the sense of public responsibility on the part of American business leaders who want to help prevent destructive swings in the levels of new investment.

It cannot be too strongly emphasized that there is still nothing automatic about the carrying out of these long-range plans for business spending. Actual expenditures are still governed in major degree by the general health of our economy. This is fully attested by the fact that the current business recovery has led to a substantial upward revision of the investment plans reported to us last fall when we made a preliminary check of plans for 1955. Either private economic excesses or a reversal of the recent improvements in federal tax policy could gravely upset realization of present plans. Fortunately, neither of these possibilities seems to be an immediate threat.

The very fact, however, that American business management has made these plans and will do its utmost to carry them out is a development of tremendous constructive importance for the American economy. It means that major efforts are being made to tame what historically has been an economic wild horse—the process of capital investment by business. Both for doing it, and for telling us about it in our annual surveys, we extend to American industry our sincere thanks.

*This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community covered by our industrial and technical publications.*

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*Donald C. McGraw*  
PRESIDENT

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John Lawton and K. L. Newby

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## AIR TRANSPORT

### Major Airport Aid:

## Rothschild: No! Rizley and Lee: Yes!

By Katherine Johnson

Civil Aeronautics Board Chairman Russ Rife, and Civil Aeronautics Administrator Fred B. Lee last week supported a sharply accelerated long-range airport development program, leaving Under Secretary of Commerce for Transportation Louis Rothschild to defend the Administration's opposition to this plan.

Rife, Rothschild did not give full support to the Eisenhower Administration's handling of airport development. Pleading that his own money was made available for airport development in fiscal 1954 to enable the Administration to make a study, that the men for all that was increased to \$20.7 million in fiscal 1955, and that the Administration then dropped its request to \$11 million for fiscal 1956. Rothschild answered "That all happened before I came into office. I certainly would not endorse this kind of an approach."

(The House has increased the Administration's \$11 million request and voted \$30 million for fiscal 1956.)

The three government representatives opposed legislation establishing \$65 million annual appropriation for federal airport development in the next four years—\$20 million in the U.S. and \$45 million in territories and possessions. Introduced by Sen. Mike Monroney (D-Ga.) chairman of the Aeronautics Subcommittee of Senate Commerce Committee, the measure is cosponsored by Sen. John McClellan (D-Mo.) (ENR May 9 p. 111).

Rothschild backs "flexibility" in the airport program, that he opposed legislation setting a fixed appropriation for airports over a five-year period as the Monroney bill. He said that airport funds should be a matter of annual appropriations to permit sound fiscal management and enable the Bureau of the Budget to weigh airport requests against other requirements for federal expenditures.

Noting that the Administration has recommended a program of \$12.5 billion an aid for interstate highways over a period of years, Monroney asked "You can fix the Administration to be liberal on highways, and then recommend almost a complete withdrawal from participation in airport development."

which is generally advocated, is not?" Rothschild doubted that the Administration would support airport aid of \$65 million annually.

Asked what he meant by "flexibility" in the airport program, Rothschild responded "My own desire and intention to work for a program with some flexibility in it." Monroney responded that he considered the Eisenhower airport program "about as rigid as you can get."

Rife and Lee both refused from specifically endorsing or opposing the Monroney bill, pointing out that the Under Secretary of Commerce for Transportation spoke for the Administration. But their reactions amounted to continuing proof of the need for a study expanded program.

### Lee Outlines Needs

Rife called for a "vigorous airport program." He pointed out that, over the past four years, CAB has had to authorize air carriers to suspend service at 55 points because of inadequate airports.

Rife also urged that federal lands be available for financing terminal buildings—a policy opposed by the Administration. He said "Passenger and freight handling facilities are becoming seriously inadequate. It is a task as long to get your baggage at Washington National Airport as it does to fly in from Chicago."

Under questioning by senators, Lee outlined these facts:

- CAA's 1954 national airport plan shows airport deficiencies at 2,075 locations, requiring a total contribution requirement of \$200 million.
- Airports for federal aid for fiscal

1956, by state and local governments, totaled \$935 million. Of these, CAA authorized \$75 million eligible under the criteria established by the Eisenhower Administration a year ago. (It is equally for federal aid an airport must have a minimum of 5,000 loadings a year or 10 based aircraft, or a combination of the two. Monroney pointed out that at a total of \$30 million, it would take four years to take care of the projected demands for only fiscal 1956.)

• CAA estimates an increase in passenger traffic from 53.7 million in 1951 to 53.0 million by 1963, which would require 542 million in 1946. CAA's estimates, Lee said, have been exceeded. This 10% traffic increase CAA anticipated in 1954 over 1953 developed at a 22.5% increase.

### Freight Inadequacies

Lee, concerned with Monroney's observations that there are no existing civil airports capable of handling commercial jet aircraft, expected by 1960.

CAA anticipates a doubling of freight traffic by 1960, Lee said, and he added that this would depend on existing conditions, which, in turn, would depend on existing handling facilities at airports. Lee concerned with Monroney's observations that "there are now no adequate freight handling facilities. There are all the better air types."

Robert Altmire, president of the Airport Operators Council, strongly endorsed the Monroney bill. He said "There are no airports granted to the volume of the Vietnam that Capital Airlines plans to put into operation, because the Vietnam can't wait a half an hour for loading."

## India Seeks Possible Saboteurs

New Delhi—The Indian government has asked Hongkong authorities to speed up extradition proceedings on two Chinese based in France for questioning with regard to the April crash of an Air India International Corporation aircraft in Indonesia. The search, under charter, was carried out by Chinese Customs officials from Peking to Hongkong for the Air India Corporation.

Following a charge by the Indian Embassy in Hongkong, the Hongkong government advised the possibility that a bomb bomb was placed in the wheel well of the "Golden Princess" as it was being refueled at Kuala Lumpur. Preliminary Indian investigations appear to be part of a bomb having been found, and India is investigating the possibility of Chinese complicity.

According to V. K. Krishna Menon, Indian foreign minister, the crash held up the release of the late USAF pilot, who was held separately. One of the co-pilots at Hongkong, India is said to have up its endorsement of the flight's release pending the findings of the Indonesian Commission.

## New DME-Tacnac Probe Urged

An exhaustive joint congressional investigation of the DME-Tacnac rate-growth and construction was announced last week by a House Government Operations Subcommittee on the Atlantic.

Rep. Glet Hoffeld (D-Calif., chairman of the subcommittee, was strongly critical of the airlines' handling of the issue.

"He said it is 'an example of the airlines going into full scale production as a government before the issue is resolved.'"

Other committee recommendations:

- Limit the delivery of Tacnac equipment. "In no case should the Services of the Department of Defense permit further production deliveries to excess of such amounts necessary for national development," the report stated.
- Review the functions of Air Navigation Development Board, Air Coordinating Committee, Civil Aeronautics

Administration and military department concerned with the common interest for re-negotiation. The committee asked the President to report to Congress on the study and if justified by the study submit a comprehensive plan.

• Perform a thorough audit of costs incurred on the outstanding contracts and the amount of the government's obligations under existing Tacnac contracts. Audit might be done by the General Accounting Office. Subcommittee also asked GAO and Bureau of the Budget to submit an estimate by Dec. 31 of the projected ultimate cost of the industry Tacnac program.

- Declare the issue.
- Provide the committee with a report by the Secretary of Defense which would show cause as to the current program and why (the Tacnac) should not be reconsidered for the purpose of achieving greater competition and a possible reduction in costs.

## Board Stands Firm In Mail Pay Case

Reports of Pan American World Airways and Trans World Airlines that Civil Aeronautics Board considers a decrease in the trans-Atlantic mail rate case have been rebuffed by the Board.

Both carriers asked CAB to change ratings made in a decision supporting the mail case to determine whether PAA and TWA have profits in other domains which can be offset against the two carriers' trans-Atlantic relayed requirements.

The carriers objected to ratings that operating results be measured on basis of lowest cost and efficient management to determine excess earnings of other domains, that results of operations of other domains occurred by past period rates be reviewed, and that results of PAA Latin American operations Jan. 1, 1946 to Apr. 5, 1945 be included. Pan Am also asked to be allowed to raise other additional evidence.

CAB says it must review management practices, rather than just accept airline reports, because such a general rule is necessary to determine real value from the Civil Aeronautics Act.

In addition to the other points the Board found that the carriers' arguments didn't justify a change in the original decision.

## Los Angeles Airways Reports \$97,000 Net

Los Angeles Airways reports net profits of \$97,000 for 1955, based on 1955, more than triple the \$27,866 earned during 1954.

Operating revenues climbed to \$549,465 reflecting the helicopter airline's first year of passenger and express service.

During 1953 mail and charter contracts totaled \$490,742. Operating expenses for last year were \$779,465, compared to \$755,118 in operations costs during 1953.

The 1954 operating profit before nonrecurring mail pay totaled \$61,619, a slight decline from \$62,795 for the previous year.

The nonrecurring mail pay amounts were for 1954 \$214,448, for 1955 \$177,445.

President C. M. Behan says LAA will add another Sikorski S-55 next August to its fleet of four S-55s and three S-61s. The mail and cargo S-61s will be retired.

Behan reports the airline will begin development this year of instrument flight.

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## PanAm Faces Stiff Mail Pay Cut

Pan American World Airways will take drastic cuts in mail pay for Latin American and trans-Pacific operations under terms of a Civil Aeronautics Board proposal.

The CAB has ordered Pan American to show cause why it should not act rates for Pacific and Latin American operations which cut the Pacific trans-mail pay rate in half and mail rates for the southern division by two thirds.

The order cuts PAA Pacific operations from the temporary annual rate of \$14,462,000 set this year after a steadily service mail rate. The new rate would produce an estimated \$8,983,000 in 1957.

In Latin American operations, the order would set mail pay at \$4,473,000 annually, compared to a forecast of \$13,485,000 made by Pan Am. Both temporary rates are effective Jan. 1, 1957.

The Board opened the mail rate for trans-Pacific operations in December 1955 effective Jan. 1, 1956. In April 1956, the \$11.5 million temporary rate was pending determination of a new final rate.

In setting the new temporary rate, CAB observes that the expected operating losses need be trans-Pacific operations for the year ending Mar. 31, 1955, was \$4,688,800. This rate is 56 cents a ton-mile, equal to the service rate established last year for both PAA and Northeast Airlines. Based on current estimates, the rate will yield approximately \$5 million this year.

Pan American's Latin American rate is spread effective Dec. 31, 1955, when annual rate was \$13,171,000. Pan Am wants to re-negotiate the rate now that PAA's Latin American Division subsidy agreement was high in relation to those of other U.S. carriers in the area and that improvement in the requirement should be available to be negotiated, the Board stated.

Pan American forecast a mail pay requirement of \$13,485,000 annually for Latin American operations. The Board notes that this reflects an increase in the subsidy requirement, and the projected losses would be in the next recent 12-month period, the year ending Mar. 31, 1955, was \$4,473,000 the proposed rate.

In long, temporary rates which include subsidy, CAB policy is to provide only enough to sustain operations, but not less than the service mail rate.

Mail pay involved in the current rate and as PAA forecasts a high in relation to that received by other U.S. carriers, CAB observed.

Mail pay for Transpac, Burrell Airways and Delta-CGS Air Lines amounted to \$4,556,000 in 1954.

## New Canadian Flights

Canadian Pacific Airlines plans to start coast-to-coast flights between Vancouver and Kamour, aluminum company of Canada, is making arrangements for the West Coast. New services will be made possible by installation of new radio navigational aids by Department of Transport in British Columbia.

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## KLM Leads Airlines' Opposition To PAA's Atlantic Freight Rates

By Gordon Goady

New York-Pan American World Airways and KLM Royal Dutch Air lines are waging a bitter fight over rate reductions proposed by PAA for trans-Atlantic air cargo. Last week KLM appeared to back the Civil Aeronautics Board and in support of International Air Transport Association air carriers.

If the two airlines fail to settle their dispute before the present rate agreement expires June 30, it could result in:

- Open cargo rates. With no IATA agreement, a Pan American spokesman said, each trans-Atlantic air carrier would use whatever tariff structure it could push through the government concerned.
- Delayed reductions. KLM predicted the present structure would be extended to Aug. 1 and a new tariff put into effect at that time. "It's the absolute thing to do," said an official of the Dutch airline. "We've asked for an extension and for another IATA meeting to draw up a new agreement."

Trans World Airlines backed up KLM's stand. "We'd like to see the present rates continued until positive differences are worked out," said one TWA official.

**Opening Pouch**  
First attempt took place last month in Paris at an IATA traffic conference called to set an Pactia's plan to lower air cargo rates on North and Middle Atlantic routes. The proposal, adopted earlier by a meeting of airline executives in New York, gave an average cut of 30% on about 50 core routes.

The Paris meeting broke up without agreement when KLM questioned Pan American's plan to give additional discounts at break-points of 3,000 lbs. and 7,000 lbs.  
"We didn't understand the break points," said a KLM spokesman. "They were positive and couldn't possibly do any good. Maybe one shipment a month is flown at that weight. Reducing it does no good; the actual savings is 150 lb. on freight and 67 lb. on passenger transport."

"Since Pan American wanted the break points, it should have been able to prove the need for it. We were ready to go along," one Pactia spokesman said. "We're in the situation of 26 other carriers—including Trans World Airlines."

PAA officials said the opposition to break points on bulk shipments slowed plan making for the future and left

retired in building up an cargo. "If we don't set up volume rates," one said, "How are we going to attract volume shipments?"

### No Decisions

Pan American officials charged the Paris meeting was not called to vote on the rate cuts but to work out both sides' details of the proposals.

The airline was particularly angered by the reduction in March. IATA approved a unanimous, by mail vote in April, all governments agreed, and one spokesman. "We understood the Pan American was going to be a nice fella."

"We had one trade with CAB and were intended to feed the other airlines but not feed them. KLM and the others backed down on their agreement."

The Dutch airline and Pan American was the pressure barrier to lowering trans-Atlantic air cargo rates and allowed it of making to fall down its price point sharply IATA, "single to attract public" to PAA.

"The New York meeting was an emergency conference where the proposal was agreed to in principle with the understanding that another meeting in Paris would be called to discuss the paper in detail, modify it and approve the new rates."

We all wanted rate cuts. The only thing we didn't want was the additional break points. KLM was one of the leading carriers for reduction, and all the others agreed to reduce rates."

"But Pan American simply vetoed the effect of all other airlines at Paris and took off on its own. Pan American proposed the rate cuts up, to attract public to itself."

### Next Round?

Meanwhile Civil Aeronautics Board asked PAA to withdraw the new air cargo tariff structure filed in line with its trans-Atlantic proposal.

## Slack Builds Up Fleet

Slack Airways is adding three DC-6s to its new fleet to expand its cargo capacity and maintain flight frequency.

The scheduled freight line acquired the DC-6 through a lease-purchase agreement and bought the C-47 from the Air Force. They received Slack's fleet to 21 scheduled freight DC-6As, three DC-6s and 17 C-47s.

## 40% Rate Cut

American Airlines is reducing its cargo rates 40% on non-scheduled shipping. Low volume shippers will have no discount, but those shipping more than 100 tons will receive discounts up to 10% to 20%.

The 40% reduction went into effect last week lowering air cargo rates from 24 cents to 12 cents per ton mile on day routes from the West Coast to Midwest and East Coast cities. Principal commodities affected were clothing, dry and green goods, textiles, furniture, glass, hardware and paper, leather, fur, books, produce, perfume, tennis sporting goods and toys.

The new cut floor rate will go into effect July 6.

"The confusion is," said PAA. "The Board earlier told us the new rates were a fair compromise to the 45% cut in passenger fares. Bulk shipments in 1963."

Pan American and the new fleet would stand in line with CAB and, pending new developments, would go into effect July 7. "We have got to make sure," said one PAA spokesman. "Last progress airlines don't give a damn about air cargo or its future, but they're going to have to let it grow steadily."

## ACC Announces New Aircraft Lease Plan

U. S. domestic freight operators that are unable now to afford new cargo aircraft last week were offered the opportunity to lease or commercialize new available military cargo planes from the Navy under terms of a plan approved by the Civil Aeronautics Board.

This is a government plan to assist industry efforts in promoting further development of commercial air cargo operations by providing additional capacities.

The rental rate will approximately \$25,000 a month. It was originally a Navy proposal to create a reserve cargo fleet in long (AWP, Feb. 28, p. 13). ACC's plan included in scope the Navy's additional program.

### Preference Rules

The Navy currently estimates that it will be able to make available fewer than 100 DC-6A aircraft that may be offered from its own operations through gradual cashing out of Navy airplanes. They have an active waiting list of 15 companies requesting approximately 45 planes.

Applicants will be screened by the

Civil Aeronautics Board, which will make the final selection of carriers, although Navy will retain administrative responsibility. Preference will be given to carriers who have shown an interest in air cargo operations by:

- Actual participation in the air cargo service
  - Air cargo promotion, advertising and education
  - Possession of certification authorizing cargo transportation as a demonstration of actual efforts to secure certification
  - Substantial participation in cargo effort or transport air cargo operations
  - Demonstrated requirement for additional commercial cargo capacity
- Landed aircraft will be limited to commercial cargo use only and will not be used in the performance of military contract or military charter operations. Use as passenger service is expressly prohibited. Landed aircraft are not to be used to replace existing aircraft but must be a net addition to cargo lift.

#### High Rewards

The task assignments will be divided into two phases. First the aircraft is to be leased for six months and will be issued one year after the initial phase, the lease is renewable only on the presentation of evidence that a firm order has been placed for a newly manufactured cargo aircraft. The six-month period specified in the contract would be tied to the delivery date of the new purchase.

Rental rates as the Navy aircraft will be high. ACC said this is necessary to provide an element of subsidy either directly or indirectly. The leasing will be at rates in line with costs of commercial ownership. These are based on annualized estimates of acquisition costs, including all necessary equipment, the projected 7-year rate of depreciation, rates of return and allowances for taxes.

- ACC and three firms were designed to meet the following objectives:
- Make commercial air cargo capacity available more quickly than is possible through present placement of orders
- Encourage participation with air cargo operations for a limited period prior to long-term financial commitment
- Stimulate the procurement of additional cargo aircraft

To avoid disruption in the transportation industry and eliminate conditions that might make lease prohibitive to shipping, ACC also established rules which include:

- Making available only aircraft already owned by the Navy and banning the purchase of planes by the military for later lease under the program
- Setting the terms of the lease high enough to avoid the element of subsidy and prevent impacting on freight rates

## Senators Call CAA Service Cuts Pressure Tactic to Boost Funds

By Peckle Steyer

Washington, D. C.—A Senate Appropriations Subcommittee recently criticized the Civil Aeronautics Administration for attempting to "pressure" the group into restoring House-approved reductions in the Fiscal 1956 CAA budget. Most of the criticism fell on CAA Administrator Fred B. Lee, who appeared before the subcommittee last week to justify the need for saving the fiscal amount.

The subcommittee accepted Lee's testimony as "an effort to bring pressure to bear on the way that was authorized by law not to proceed by the House Appropriations Committee," the Senate group also advocated the immediate appointment of a deputy administrator.

The goal of deputy administrator will be filled, according to Louis K. Rothchild, Under Secretary of Commerce for Transportation. The position was last held by Lee before he was appointed Administrator two years ago. Although the post was never abolished, Lee has never appointed a deputy. When he became Administrator, Lee created two additional assistant administrators who have divided the work of a deputy.

The absence of a deputy administrator apparently has been a source of difficulty between Lee and Rothchild. The Under Secretary was last evicted last. Rothchild told the senators "CAA has had a deputy administrator and is going back to it. We've just had a mutual discussion of the need for the job."

#### 'Less Than Satisfactory'

He said that Lee's record and his financial management during the office due to them resulted in one con-

clusion with CAA in purpose of information on long less than satisfactory. Rothchild said he felt that "certainly one step with over 15,000 people in it shouldn't be headed by one single person whose sole responsibility it is to make all the decisions and on which all this responsibility rests."

Rothchild is believed to have selected Charles Lowen as CAA's deputy administrator.

The new appointment probably will not be announced until the beginning of the new fiscal year (July 1). Lowen, a former fixed-base operator and more recently Director of safety and costs, joined CAA a month ago as a consultant.

#### Service Cuts

Legs difficulty with the Senate Appropriations group developed when he told the subcommittee that when the House reduction is included in next year's budget (AW, Mar. 30, p. 95), it would be necessary to take the following actions:

- Decommissioning approximately 429 or 50% of the aircraft light beams
- Closing approximately 44% or 54% of the intermediate landing fields need for emergency landings of aircraft
- Closing approximately 16 intermediate communication stations, or a total of 65 less than the number reported in Fiscal 1955
- Eliminating new airport traffic control towers, direct communication equipment, and direct landing operations
- Eliminating some planned or leased and duplicate radio airport traffic control service and certain precision radar landing services
- Eliminating a spread up from 75 to 100-watt and changing allocation on the service "B" telegraphic air network, for



#### American's Boston Hangar

American Airlines' new \$24-million hangar at Boston's Logan International Airport features an experimental blast door that is designed to deflect sounds away from a densely populated residential area in the field's perimeter. The new hangar, taken over by AA on a 25-year leasehold basis, will accommodate four DC7's or six Constellation. It is claimed to be the largest prefabricated commercial metal hangar in the United States.

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- Controlling the level of supplies and supporting services in the federal air-train program
- Refining the staff available for administering the government air support program
- Eliminating 50 positions in the program of station sales
- Eliminating a medical standards unit and a staff of transferring certain government services to responsible agencies of the military

Lee urged the Senate group to take the necessary steps to prevent "these actions which are adverse to our efforts of maintaining the established record of safety in aviation."

#### 'Pressure Device'

Senate committee members once again attacked CAA's attitude toward the House budget cuts. Chairman Brooke of Holland (D-Mt.) framed it just a "pressure device." He said, "It seems to me that if CAA proposes to apply these cuts in such a manner, they are violating completely the recommendations of the Transportation Committee. It directed the cuts should be applied in such a manner that safety in aviation will not be affected."

Sen. Holland further told Lee "there is no question the way you propose to apply these cuts would very definitely put safety in aviation and that it is directly aimed at that objective. It is a complete failure by CAA to follow the suggestion and recommendations of the House committee. As I've said, 'When one of these cuts is directed at the very factor of safety which the House committee instructed you not to diminish.'"

Rothschild, who accompanied Lee, attempted to clarify the position of CAA.

Sen. Holland told Rothschild "it was hardly a reasonable position to say that their relatively minor reductions (37%) reflects all that destruction of an industry."

It was made clear by Holland that the Senate committee was not necessarily committed to the same course of action as the House. "We don't want to use the agency taking a position that looks like it is playing house" with the recommendations of the House. Finally, I believe that is exactly what you're doing," Holland said.

#### Lee's Reasoning

Sen. Miles Boggs (R-N.H.) predicted that the CAA's proposed program was "going to create quite a commotion."

Holland charged that the CAA approach was "unrealistic." He compared the House approved \$170 million FY-66 2950 budget with the \$120 million projected for Fiscal 1955. Specifically,

Holland explained an item for costs inherent of air navigation facilities in which the House allowed an increase from \$5 million for Fiscal 1955 to \$10.5 million for Fiscal 1956.

Lee replied that the costs paid out for themselves, if necessary, might have the least effect on safety. He said, however, that the dramatic growth of aviation and the resulting workload on CAA requires increasing the dollar level of all programs. "Primary factors cited by Lee as affecting the workload were:

- Increase of aviation air services
- Expansion of commercial operations
- Increase of personal flying
- Expansion of experimental aviation

Particular emphasis was placed by Lee on expansion of aviation operations which he said are causing real problems in aviation air acquisition of aircraft.

Lee complained of CAA's inability to forecast the volume of workload generated by the industry. He said it is substantially in excess of what we had expected and a still more than adequate cost estimate, we now find, that heavier effort cannot be expected to produce much more traffic handling capacity from our existing system. Some relief is necessary, and until an expanded action is in operation, there are no alternatives available other than increasing the staffing or curtailing the amount of air traffic."

## Pilot Error Blamed For Lodestar Crash

Failure to follow accepted single-engine procedure was the probable cause of the crash of a Lockheed Lodestar near Hartford, Conn., which caused the death of the co-pilot, according to the Civil Aeronautics Board accident report.

The report found that the pilot of the Lodestar, owned by John Fox, publisher of the *Hartford Post*, failed to use the full power available and adopt accepted single-engine procedure when it became necessary to feather one propeller.

The crash occurred on a flight between New York and Boston. Near Hartford, the right engine became single and it was necessary to feather it. The pilot made a wide right turn and headed for Bradley Field, Waterbury Locks, Conn. During the turn, the airplane descended from 3,500 to 2,500 feet, and it continued to descend after banking for Bradley field and it struck the ground.

The accident report found that while the operative left engine was not developing normal power for each setting, there was probably sufficient power to maintain flight under accepted single-engine procedures.

## NAL Buys Radars

National Airlines will install airborne radar on its fleet under a contract with Bendix Radio Corp. of Baltimore, Md. Installation will be made on DC-7, DC-5B, DC-6 and Convair 440 equipment.

## CAB ORDERS

(May 25-June 1)

### GRANTED

Post of New York Airlines and the Metropolitan N.Y. Lines, Chapter at Elmwood, have to remove to the Eastern Air Lines with consolidation card.

As Eastern promises to sell, the firm, Pacific West International, Japan.

### APPROVED

Agreements between Capital Airlines, Midwest Airlines and Eastern Air Lines to issue to customers.

Los Angeles Service flight pattern was not adding to the flight schedule. Eastern Air Lines and Western Air Lines to issue to customers.

Revisions between Eastern Air Lines and the International Air Transport Association relating to the flight schedule of North Atlantic and Mid Atlantic air routes. Eastern Air Lines.

### AMENDED

A CAB order, to delete two paragraphs from the proposed amendment and consent of Capital Airlines concerning the issue of an emergency certificate and its relationship with the administration of Capital.

Aviation Agency, Ltd.'s authorization to conduct an electric engineering survey, to certify the transmission data to June 10, 1955.

### ORDINED

Western Air Lines' exception to the Board decision in the proposed Western Island and rate one decreased. A request for and payment is denied and the decision is made effective immediately.

Allegations of Airline to government to open an inquiry between Pittsburgh and Atlantic City between June 1 and April 10, 1955, plus other allegations contained in other correspondence to government.

Investigation of certain cost based flight rates filed by American Airlines, Capital Air Line, Northwest Airlines, Sky Service, the Prime, Vips, East, Trans World Airlines, and United Air Lines be terminated since the parties opposing the rates have with drawn their complaints. Decision of the Bureau Express Agency to change of the conditions be overruled and a petition of RLA to have its contract be dismissed.

### DENIED

Eastern Air Lines' petition for reconsideration of the decision in the New York-Boston service rate, and request for extension of the time limit for filing of any change agreements.



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## Jet Transport Race Enters the Stretch

American Airlines \$65 million order for 75 Lockheed Electra turboprop airliners has translated winning of all the U. S. entries at the international jet transport race.

The turboprop acceptance that began as a four-horse race between Douglas, Convair, Vickers Armstrong and Lockheed, was won by the latter. With the Electra as a passenger liner and the C-130A as a commercial cargo plane, Lockheed now plays a strong hand in the market provided the Airbus A310 powerplant development keeps pace.

Douglas and Boeing are now competing for the long range turboprop transport market with the DC-8 and the commercial version of the KC-135 military tanker, respectively. The Douglas decision to devote its research efforts to getting the DC-8 prototype into the air was triggered, as Donald Douglas, Sr., indicated some weeks ago by American Airlines choice for its turboprop transport award. The Douglas-Boeing turboprop race promises intense competition and some serious risk, to be decided even before this year's end. Both United Air Lines and Pan American are reported close to a decision on their turboprop equipment. However, American Air Lines itself insists on keeping a good jump ahead of its competitors on equipment and may make a surprise move in this direction.

During the recent trials we have heard many expressions of admiration from airline engineers on the success of the latest DC-8 proposal made possible by a comprehensive program of design refinement from the commercial viewpoint.

### Reliable Engine

Boeing faces a tough problem in getting Air Force approval for its commercial production of the KC-135 design before the entire military tanker order is delivered to Strategic Air Command. Recent evidence of Bataan progress in the production of long range B-52 jet bombers and turboprop tankers has made it more difficult for Boeing to win its entire agreement with the Pentagon and SAC on commercial production.

Neither Boeing nor Douglas should have any concerns over the JT3L turboprop they plan to use in their jet transports. In its J57 military version this engine has been in production at Pratt & Whitney Aircraft in East Hartford and, under license, by the Ford Engine Division

in Chicago for more than two years. There are already more than 1,000 J57s in military service, and it has demonstrated reliable operation at the extreme altitudes proposed for the jet transports. Ironically although the J57 has been consistently certified by the Civil Aeronautics Administration at a rating of about 11,000 lb. thrust the Pentagon is still imposing arbitrary thrust restrictions that prevent Boeing and Douglas from doing this engine with their prospective customers.

The Lockheed Electra turboprop in the medium haul class and the Douglas and Boeing turboprops for long range operations probably will meet airline requirements for as far into the future as it is feasible to predict at the moment. Both types represent the arrival of a fundamental powerplant revolution in the commercial field. The turboprop and turboshaft will remain as the scene in the development cycle stretches their power for a good many years until another fundamental technical revolution—possibly nuclear power—displaces them.

### Strong U.S. Hand

It is interesting to note that the widespread use of gas turbine powered transports now seems destined to occur in the 1959-60 period predicted by American aeronautical experts such as Donald Douglas and Frederick B. Rothacker of United Aircraft Corp. rather than in the early or mid 1950s as the British experts forecast.

In the international competition, finally with the British the U. S. gas turbine powered transport hand looks strong. Appearance of the Lockheed Electra with the endorsement of American Airlines will make progress for any more large scale sales of the Vickers Viscount in this country. The Electra should provide extremely stiff competition abroad for both the later versions of the Viscounts and its successor now under development by Vickers with Rolls-Royce turboprops.

The Douglas and Boeing jet transports face the Bristol Britannia turboprop entry, the Valiant V-3300 using the Rolls-Royce Conway bypass turboprop and the de Havilland Comet IV with conventional turbojets. They should continue to uphold the dominance of American built equipment on the airlines of the world.

The international jet transport race is entering the final stretch. Decisive results should be forthcoming in the near future.

—Robert Hite

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